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Medical and Surgical Report

of

The Roosevelt Hospital

New York

· 1915 ·

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MEDICAL AND SURGICAL REPORT

OF

THE ROOSEVELT HOSPITAL

NEW YORK

1915

MEDICAL AND SURGICAL REPORT

OF

THE ROOSEVELT HOSPITAL

NEW YORK

BASED ON THE WORK OF THE
YEARS 1910-1914, INCLUSIVE

EDITED BY

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EDITORIAL NOTE

The Editor desires to express his appreciation of the cordial co-operation by which all the authors of this volume of reports have helped to make the oversight of its production a pleasure rather than a burden. And his thanks are particularly due to Doctor John A. McCreery for valuable aid in the correction of manuscript and the arrangement of material.

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FOREWORD

If all the inspirations that have resulted in the publication of every book were known they might probably with fairness be divided into two great classes, Ideas of Getting and Ideas of Giving; and, if we had time in this busy life of ours to analyze the origin of a desire to give, we should usually find it, I make no doubt, in a feeling that we had already received somehow, somewhere, value in return.

It is so in the present instance, at any rate; and we should like the spirit of this little volume to be conceived as intending to present to The Roosevelt Hospital our acknowledgments of courtesies received and opportunities enjoyed, and as offering to our colleagues of the medical profession some return for the help we have found in their publications from other hospitals.

As for the form of the Report: it is intended, so far as possible, to present in our papers not the work of individuals but the work of the divisions of the hospital and of the hospital as a whole. For, in this age of brilliant specialization, it is not always remembered that the proper activating spirit of such individualism is co-operative; nor is it always recognized that co-operation cannot be carried to its furthest limits without the fullest development of specialization, where each individual does his small share of a great work.

With the development of broader fields, of course, the individual workers appear each smaller in proportion than

of old, and there is, perhaps, less notable distinction between them one and another. And for this very reason we shall probably never again see such great men as we have bowed to in the past, or at least they can never seem as great. Yet still our work may be well worth the while.

For forty years the work of The Roosevelt Hospital has been favorably known within the limits of that great community which it has helped to serve; and for at least a score of years its reputation and connections have spread and broadened beyond those limits.

The attending staff has numbered within its membership such men as Sands, McBurney, Halsted, Draper, Delafield, McLane, Bull, and Weir—men whose names are known and whose writings have been quoted throughout the western hemisphere.

Some of their work was truly pioneering. McBurney's development of the aseptic surgical technic, for example, and his advances in the field of abdominal surgery, are classical and stand to-day, their value proven by thousands of repetitions; while Delafield's painstaking investigations, with Prudden, into the pathology of nephritis and cardiac disease aroused an interest in the pathological aspect of medicine that was one of the sources of our present enthusiasm for laboratory research.

Nowadays we have to realize that the opportunities for such striking and individual advances are more limited; and we must redouble our effort to make the most complete use of the knowledge that we have already acquired.

For some time it had been felt that this aspect of hospital work was not, perhaps, fully appreciated; and

the feeling finally crystallized, at The Roosevelt Hospital, in a determination to elaborate a system of classifying and filing the case records in such a manner that the mass of scientific data constantly being accumulated might be made more available for use in collecting and reporting statistics of the hospital work.

The task of developing such a system was delegated by the Medical Board to Doctor Martin and Doctor Lambert, then members of the attending staff, about six years ago, and the result of their careful and painstaking work will be referred to in the following pages.

About the same time funds were secured, through the generosity of Mr. Edward Harkness, then a trustee, to build and equip the present record-room of the hospital. Provision was then made by the Board of Trustees for a clerk who should be responsible for the details of filing; and on January 1, 1910, the system of classifying the diagnosis according to The Roosevelt Hospital terminology and of filing the records according to the terminological classification was formally instituted.

During the five years that have elapsed since that time, 21,025 patients have been cared for in The Roosevelt Hospital, and the diagnosis and records of over 25,000 pathological conditions from which they suffered have been filed in accordance with the terminological classification.

The result is that we have on hand, in a very available form, a considerable amount of scientific literary material, of whose collation and arrangement this present volume represents the first-fruits.

EXPLANATORY NOTE ON THE ROOSEVELT HOSPITAL TERMINOLOGY

Since almost all the reports included in this volume are based on material collected through the use of The Roosevelt Hospital Terminology and Filing System it has been thought that the latter deserved some preliminary mention, and it is hoped that a readier comprehension of the method of classifying the patient's condition at The Roosevelt Hospital may be afforded by the following explanation.

This terminology was compiled by Doctor Walton Martin and Doctor Adrian V. S. Lambert some six years ago, and was at once adopted by the Board of Managers of The Vanderbilt Clinic and by the Trustees of The Roosevelt Hospital.

Since January 1, 1910, pathological conditions have been recorded in these terms at The Roosevelt Hospital, and the records have been filed in accordance with the classification upon which the terminology is arranged.

In so far as possible this classification is based upon the etiological relationship of the members of each group one to another, while the large number of conditions which could not be so classified have been grouped upon a basis of anatomical relationship.

The etiologically classified groups are:

1. The diseases due to animal parasites.
2. The congenital malformations.
3. The deformities.

4. The injuries.
5. The diseases due to micro-organisms.
6. The neoplasms.
7. The non-parasitic poisons and intoxications.

I. Under the diseases due to animal parasites are included only those due to metazoa; the unicellular organisms (protozoa, etc.) are included in group V.

II. Under the congenital malformations are grouped all those alterations in form present at birth and due to prenatal causes.

It is obvious that an arbitrary division must be drawn between certain of the malformations and the neoplasms. For example, demoid cysts may be grouped here or under neoplasms. They are placed under neoplasms.

III. Under the deformities are grouped those changes, the result of injury or disease, whose sole significance is an alteration in form.

IV. Under the injuries are grouped the general and local effect of mechanical and thermal violence and the action of corrosive chemicals.

V. Under diseases due to micro-organisms are grouped those disorders due to the lowest vegetable parasites (mould, yeast, etc.), to unicellular animal parasites (protozoa), and bacteria. (Koller and Wassermann.)

VI. Under neoplasms are grouped the so-called autonomous tumors. Retention cysts and abnormal collections of fluid are not included here.

VII. Under the poisons and intoxications are grouped the exogenous intoxications (the various non-parasitic poisons) and those endogenous intoxications which could not be grouped under one of the anatomical systems.

The anatomically classified groups comprise certain pathological conditions connected with

I. The alimentary system.
II. The cardio-vascular system.

III. The connective tissue.
IV. The ductless glands.
V. The muscular system.
VI. The nervous system.
VII. The osseous system.
VIII. The reproductive system.
IX. The respiratory system.
X. The sense organs.
XI. The tegumentary system.
XII. The urinary system.

The anatomical terms are those of the Basle anatomical nomenclature and the medical terms were in most instances taken from the Bellevue Hospital nomenclature through the courtesy of Doctor Warren Coleman.

As many of the conditions classified under the various etiological groups require definite bodily localization, a regional division of the body is specified:

Regions of the Body

Head :

Forehead.
Supraorbital region.
Parietal region.
Occipital region.
Temporal region.
Auricle.
Mastoid region.

Face :

Nasal region.
Upper lip.
Lower lip.
Chin.
Upper eyelid.
Lower eyelid.

Infraorbital region.
Buccal region.
Zygomatic region.
Parotideomasseteric region (including retromandibular fossa).

Neck :

Submental region.
Hyoid region.
Subhyoid region.
Laryngeal region.
Thyroid region.
Suprasternal region (including jugular fossa).
Submaxillary region.
Carotid fossa.
Sternocleidomastoid region (including lesser supraclavicular fossa).
Lateral neck region (including greater supraclavicular fossa and omoclavicular triangle).
Back of the neck (including nape of neck and nuchal depression).

Chest :

Sternal region.
Clavicular region.
Infraclavicular region (including deltoideopectoral triangle).
Mammary region.
Inframammary region.
Axillary region.
Axillary fossa.
Lateral costal region.

Abdomen :

Epigastric region.
Right hypochondriac region.
Left hypochondriac region.
Umbilical region.
Lateral abdominal region.
Pubic region.
Inguinal region.

Back:

Median region of back.
Interscapular region.
Scapular region.
Suprascapular region.
Infrascapular region.
Lumbar region.
Hip region.
Sacral region.
Gluteal region.

Perineal Region:

Anal region.
Urogenital region.
Penis.
Scrotum.
Vulva.

Upper Extremity:

Acromial region.
Deltoid region.
.....Brachial region. (Insert the word: anterior, lateral, medial, or posterior.)
.....Elbow region. (Insert the word: anterior, lateral, medial, or posterior.)
.....Forearm region. (Insert the word: volar, dorsal, radial, or ulnar.)
Dorsal region of hand.
Volar region of hand.
Dorsal surface of ..... (Insert the word: finger or thumb.)
Volar surface of..... (Insert the word: finger or thumb.)
Region of.....nail. (Insert the word: finger or thumb.)

Lower Extremity:

Subinguinal region.
Trochanteric region.
.....Femoral region. (Insert the word: anterior, lateral, medial, or posterior.)

Patellar region.
.....Region of knee. (Insert the word: anterior or posterior.)
Popliteal region.
.....Crural region. (Insert the word: anterior, lateral, medial, or posterior.)
Lateral malleolar region.
Medial malleolar region.
Calcaneal region.
Dorsum of foot.
Sole of foot.
Dorsal surface of toe.
Plantar surface of toe.
Region of toe-nail.

A few terms not included under the anatomical and etiological classifications, such as general asthenia, malingering, senility, etc., which are necessary for a general hospital service, have been grouped under the heading "Miscellaneous Conditions."

EXPLANATORY NOTE ON THE FILING SYSTEM

Of course, any Terminology fails of its fullest usefulness unless it is supplemented by an adequate Filing System; and, because they are so largely interdependent, a brief outline of our filing method is here appended.

Upon the departure of each patient that has been admitted to The Roosevelt Hospital, a discharge card, bearing his name and address, the diagnosis of his injury, disease, or condition, and its complications, if any, and the treatment that he has received, is sent to the record-room to be filed. Together with this goes the patient's chart, containing his history, physical examination, operation details, temperature, and bedside notes. The diagnosis is selected from the terminology and written by the house officer of the interne staff who has been responsible for his care in the hospital, and it is reviewed —and corrected if necessary—by a member of the attending staff on duty in the record-room.

The discharge card and chart are then stamped with the same serial number by the clerk of the record-room, and the discharge card is added to the alphabetical file (under the letter corresponding to the first letter of the patient's surname). The history chart is then filed, by serial number, to await a convenient time for binding, which usually takes place once a year. The serial num-

ber given to the history chart and discharge card is meanwhile added to the proper card in the diagnosis file, which is arranged exactly to correspond with the classification heading of the terminology. This secures a ready alphabetical reference to the individual patient's address and diagnosis and history and also allows a very rapid review of all similar cases by noting the collected serial numbers on the diagnosis card, which correspond to those of the desired histories in the files. A valuable cross-reference between associated pathological conditions is further afforded by so-called complication cards, filed with the diagnosis cards. Upon these are set down the diagnosis of each associated lesion opposite to the serial number of the case whose principal pathological condition it complicated. These "complications," with same serial number, are then transferred, as "principal pathological conditions," to diagnosis cards, filed in their appropriate class (according to the terminology), and they are there accompanied, on corresponding complication cards, by the diagnosis and serial number of the original "principal pathological condition," which now figures as a "complication." In the following diagram it may be seen how the change occurs in passing from one class of diseases to another:

Main Heading I Guide Card	Subheading I Pink Card	Principal Disease I Blue Card	Associated Lesion I Yellow Card
A	A 1	X	Y
B	B 1	Y	X

And in the following example, taken from the diagnosis file at random, it will be seen how the records are presented:

INFORMATION FROM DIAGNOSIS FILE CARDS, FIRST SURGICAL DIVISION

Main Heading I Guide Card	Subheading I Pink Card	Principal Disease I Blue Card	Associated Lesion I Yellow Card
LIVER.	Abscess of liver.	Abscess of liver. (1911) 1162, 1926, 1966, 2106. (1912) 2707. (1914) 4834.	Complication of abscess of liver. Suppurative pleurisy, 2707. Ac. appendicitis w. ac. diffuse peritonitis, 2707. Suppurative cholangieitis, 2707.

Now, examining the cross-references to "complications" of abscess of liver, we find

UNDER THE DIVISION OF PLEURA

Main Heading I Guide Card	Subheading I Pink Card	Principal Disease I Blue Card	Associated Lesion I Yellow Card
PLEURA.	Pleurisy, suppurative.	Suppurative pleurisy. (1912) 2707.	Complication of suppurative pleurisy. Abscess of liver, 2707. Ac. appendicitis w. ac. diffuse peritonitis, 2707. Suppurative cholangieitis, 2707.

UNDER THE DIVISION OF APPENDIX

Main Heading I Guide Card	Subheading I Pink Card	Principal Disease I Blue Card	Associated Lesion I Yellow Card
Appendix.	Appendicitis, ac. w. ac. diffuse peritonitis.	Ac. appendicitis w. ac. diffuse peritonitis. (1912) 2707.	Complication of ac. appendicitis. Abscess of liver, 2707. Suppurative cholangieitis, 2707. Suppurative pleurisy, 2707.

UNDER THE DIVISION OF BILE PASSAGES

Main Heading I Guide Card	Subheading I Pink Card	Principal Disease I Blue Card	Associated Lesion I Yellow Card
Bile Passages.	Cholangieitis, suppurative.	Suppurative cholangieitis. (1912) 2707.	Complication of suppurative cholangieitis. Abscess of liver, 2707. Suppurative pleurisy, 2707. Ac. appendicitis w. ac. diffuse peritonitis, 2707.

Note.—By referring to History No. A2707, we find that this was originally a case of acute appendicitis with acute diffuse peritonitis.

TERMINOLOGICAL CLASSIFICATION OF ALL DISEASES AND INJURIES TREATED IN THE ROOSEVELT HOSPITAL, 1910–1914, INCLUSIVE

Anatomical Classification

The Alimentary System:

Intestines (exclusive of rectum)	574
Hernia	1,257
Liver and bile passages:	
Liver	153
Bile passages	311
Mucous membrane of mouth, tongue, and teeth:	
Mucous membrane of mouth	8
Tongue	3
Teeth and gums	27
Œsophagus	21
Pancreas	35
Peritoneum, omentum, and retroperitoneal tissue:	
Peritoneum	758
Omentum	5
Retroperitoneal tissue	50
Pharynx, tonsils, and nasopharynx	531
Rectum, anus, and perirectal tissue	725
Salivary glands	5
Stomach	315
Vermiform appendix	1,891

The Cardiovascular System:

Blood	183
Arteries	146
Veins	223

Heart and pericardium:
Heart 927
Pericardium 27
Lymph glands and lymphatic vessels 217
Spleen 6

The Connective Tissue:

Connective tissue 392

The Ductless Glands:

Glomus caroticum (intercarotid gland) 0
Glomus coccygeum 0
Hypophysis (pituitary gland) 1
Suprarenal glands:
Addison's disease 1
Thyroid and parathyroid 141
Thymus 6

The Muscular System:

Bursæ 50
Muscles and aponeuroses:
Muscles 41
Aponeuroses 5
Tendon and tendon sheaths 56

The Nervous System:

Brain and cerebral meninges 136
Diseases of the mind 34
Nerves 98
Nervous diseases of unknown origin 261
Spinal cord and spinal meninges 75

The Osseous System:

Bones and cartilages 285
Joints 145

The Reproductive System :

Female urethra	18
Ovaries and uterine tubes (fallopian tubes):	
Ovary	321
Uterine tube (fallopian tube)	1,050
Uterus and ligaments of uterus	1,810
Pregnancy and associated conditions	695
Vagina and pelvic floor	498
Vulve and gland of bartholin	42
Male urethra and bulbo-urethral glands (Cowper's gland)	79
Penis	111
Prostate	83
Seminal vesicles	2
Spermatic cord and coats of the testicle and cord:	
Tunica vaginalis	112
Spermatic cord	134
Testicle	22
Mammary gland	83

The Respiratory System :

Bronchi and trachea	274
Larynx	32
Lungs and pleuræ:	
Lungs	1,051
Pleuræ	386
Nasal cavity and accessory sinuses	27

The Sense Organs :

Organ of hearing	144
Organ of vision and lachrymal apparatus:	
Organ of vision	26

The Tegumentary System :

Skin, hair, nails, and glands of skin	147

The Urinary System :

Kidneys and ureters:

Kidneys	964
Ureter	120
Urinary bladder	150

Etiological Classification

Diseases due to animal parasites (metazoa)	43
Congenital malformations	206
Supernumerary parts	6
Congenital displacements	5
Deformities	138
General injuries	97
Injuries during birth	0
Local injuries (not including dislocations, fractures, wounds, and gangrene)	459
Dislocations	112
Fractures	681
Wounds	197
Gangrene	43
Diseases due to micro-organisms:	
Infective diseases (not including gonorrhœa, syphilis, and tuberculosis)	1,035
Gonorrhœa	89
Syphilis	190
Tuberculosis	1,224
Local infections by micro-organisms	236
Neoplasms	2,118
Intoxications and poisons	300
Miscellaneous conditions	319

MEDICAL AND SURGICAL REPORT

OF

THE ROOSEVELT HOSPITAL

NEW YORK

REPORT ON OPERATING-ROOM TECHNIC

From the First Surgical Division

By GEORGE EMERSON BREWER, M.D.
CONSULTING SURGEON, THE ROOSEVELT HOSPITAL

One of the most important duties of an attending surgeon to a hospital is to devise and carry out in his operative work a system of aseptic technic which will insure the minimum of infection in his operative wounds.

Every infection occurring in a clean wound, and every infected wound which is not rendered sterile by the primary operation where this is possible, results in increased suffering and delay in convalescence to the patient, and increased expenditure of money, time, and effort on the part of the hospital and attending staff.

Take, for instance, the operation for the removal of a cancerous breast. Although this is often one of the most extensive operations in surgery, the wound should heal firmly in ten days, and the patient should leave the hospital in a fortnight. If, however, through any error in technic, the wound becomes infected, healing may be delayed for weeks or months, and the return to health and earning capacity of the patient may be indefinitely postponed. Each additional day that such a patient remains in the hospital as a result of infection, and every dollar that a hospital expends for his or her additional care, should be recorded as a waste product. Moreover, the prolonged occupancy of a ward bed for

such a reason often deprives other needy patients of the possibility of hospital care.

While accidental infections will occasionally occur even in the best-regulated institutions, and while it is frequently impossible to render a given septic wound sterile by the most approved and skilful operative treatment, a conscientious surgeon by perfect technic and an ever-vigilant watchfulness will reduce these unfortunate accidents to the minimum.

The writer's interest in operative technic, with a view to avoiding wound infection, dates back to the year 1895, when he began his first service as attending surgeon at the City Hospital.

In a report published the following May* he called attention to the fact that during an active service of six months 39 per cent of all clean operative wounds occurring in his service became infected.

This report resulted in considerable unfavorable comment from many of his professional colleagues, one even going so far as to state that the report "never should have been published, as it was a disgrace to the profession and would bring it into disrepute." The writer replied that to his mind the report possessed at least one merit, and that was that it was an absolutely truthful statement of facts which had occurred during an honest effort to do clean surgery under most unfavorable conditions.

That the conditions were unfavorable was evidenced by the fact that there was not in the hospital during that period a single modern sterilizing autoclave, that the

* "Operative Surgery at the City Hospital, with a Preliminary Report on the Study of Wound Infection," *New York Medical Journal*, May 2, 1896.

ligature and suture material was prepared in a wholly indifferent and unscientific manner, and that neither the operating-room nurse nor any member of the house staff had had any training in modern aseptic methods.

A second report* was published one year later, after the hospital had been provided with two new modern operating-rooms, and a complete modern sterilizing apparatus, and after an exhaustive bacteriological examination of our methods and material had been made by the late Professor Philip Hanson Hiss, of Columbia University. During this year the report stated that 9 per cent of our clean wounds had become infected.

During the following year many changes in technic were made to bring about further improvement in our results. These were all described at length in a paper read before the Suffolk County Medical Society, in Boston, and published in the *Medical Record* for March 26, 1898. In this report the use of dilute solutions of formaline for wound disinfection and dressings was advocated, and also the employment of sterile rubber gloves by all participating in the operation. During the period covered by this third report the percentage of wound infections was reduced to 7.

Two years later a fourth and final report† was made of our studies in technic at this institution. This included a number of other changes in our methods, with a careful investigation of several cases in which asepsis was lost as a result of our operative procedures. From a careful analysis of our results we were able to report

* "Operative Surgery at the City Hospital, with a Completed Report on the Study of Wound Infection," *Medical Record*, March 13, 1897.

† "Studies in Surgical Technic, with a Report on Operative Surgery at the City Hospital for 1898 and 1899," *Medical News*, September 22, 1900.

that during our last year the percentage of infection in clean cases had been reduced to 3.2 per cent, which, at that time, compared favorably with the results in the other New York hospitals, where the patients were recruited from those in the more fortunate walks of life, and not the victims of starvation, alcoholism, and chronic disease, which made up such a large percentage of those admitted to the wards of the City Hospital.

During the progress of these studies the writer visited many of the larger and more important hospitals in this city, and also in Boston, Baltimore, and Philadelphia, with a view to ascertaining the methods of hand and skin disinfection, sterilization of instruments, dressings and suture material in use by the leading surgeons; also the operating-room technic and, in general, the results obtained. When obtaining permission of the attending surgeon to observe the preparation of the patients, the surgeons, and assistants, and for the making of ward visits when dressings were changed, the question generally was asked: "How much infection do you expect in clean cases?" The answer almost invariably was: "Practically none." Later conversations with members of the house staff, and observations during ward visits, led to the belief that while the "practically none" represented the honest opinion of the visiting surgeon, such an opinion was not based upon accurate records. Indeed, the writer is thoroughly convinced that if he had been asked the same question at any time during the past ten years, during which no effort was made to keep accurate records of infections occurring in his service, his off-hand estimate of the percentage of infection would fall far below the actual figures. In fact, the

writer is strongly of the opinion that the only way to obtain the best technical results is to keep an accurate record of infection in every case submitted to operation for it is only by this means that one can be kept aware of his technical transgressions.

It would be quite impossible for the modern student of technic to appreciate the difficulties which were encountered on every side in the five years of constant effort to improve the technical results in an institution where the conditions were so unfavorable. During this period the writer was a constant observer and student of the methods being employed in the Syms operating-room by the late Doctor Charles McBurney, who established a standard of surgical technic in The Roosevelt Hospital which was equal, if not superior, to that of any other American or European clinic. Many of the changes made in our procedures at the City Hospital were the direct result of helpful consultations with Doctor McBurney, who was always ready and willing to discuss the various problems presented and to give friendly and sound advice.

The writer has referred to these experiences in another hospital for the reason that he wished to call attention to the fact that in an institution where the patients, as a rule, were seriously handicapped by a low vital resistance, due to malnutrition, dissipation, and disease, a somewhat exaggerated technic was necessary to obtain results comparable with those in other hospitals. Another important factor was that of air infection. At the City Hospital the air of the operating-rooms was constantly contaminated by floating germs, largely of the pus-producing varieties. This was frequently demonstrated

by exposure of gelatine or agar plates in the operating-room during our surgical work. To overcome this source of infection we found it necessary to cover all instrument trays, wash-basins, irrigators, and pitchers with tents or covers of sterile muslin, and to employ irrigation of the wound during our operative procedures. It was only by these methods that our best results were obtained.

When, in 1900, the writer received an appointment as junior surgeon to The Roosevelt Hospital, he was surprised and gratified to see that many of the unusual technical procedures used at the City Hospital to meet the local conditions of that institution were unnecessary, and that even better results could be obtained by the somewhat simpler but equally effective technic employed by Doctor McBurney and the author's new chief, Doctor Robert F. Weir. While this was in part due to more perfect operating-room equipment, and to a more thoroughly trained staff of assistants and nurses, the most important factor seemed to be the better physical condition of the patients.

During the first six years of service at The Roosevelt Hospital, while the writer acted as first assistant to Professor Weir, the number of clean wounds which became infected was exceedingly small, although no exact record was kept.

Shortly after the writer was appointed senior attending surgeon, a veritable storm of infection occurred. Five clean wounds became infected as a result of operations (by both surgical divisions) in a single day, and the cases operated upon in the succeeding few days also showed a high percentage of infection. One of these cases proved fatal. Two or three days after this out-

break of infection, the hospital pathologist came to the operating-room just as we were about to begin our afternoon work. Cultures were taken from the gloves of all who were to participate in the operation, also from the gowns, caps, towels, sheets, sponges, instruments, ligature and suture material. Of twelve flasks of catgut and silk, eleven showed growth. All of the other cultures remained sterile. It was thus clearly demonstrated that this wave of infection was directly due to some grave error in the preparation of our catgut. The person responsible for this was dismissed, the entire stock of contaminated gut was destroyed, and the epidemic of infection was at an end.

A year or two later, two cases of infection by the bacillus aerogenes capsulatus occurred within a period of two or three days, one on the First and one on the Second Surgical Division. Both cases proved fatal. A thorough investigation of our methods and material was made, including an elaborate series of tests of our steam sterilizers, which were of an old model and had been in constant use for over fifteen years. While the source of the gas bacillus was never discovered, the investigation demonstrated a definite defect in our autoclaves. These were practically rebuilt and rendered in every way as efficient as any of the most modern design. Repeated bacteriological tests since that time have demonstrated that our material is not only free from living bacteria, but also spore-free. For this valuable work, and also for many months of patient investigation on the preparation of our catgut, the hospital is indebted to Doctor Karl Connell, of the attending surgical staff.

For some years, both before and after this investigation, our results seemed so satisfactory and the accidental infections so far apart that no special inquiry was made to ascertain the exact number or percentage.

During the early part of 1911, however, one or two unexplained infections occurred which led the writer to inaugurate, on the First Surgical Division, a weekly report of every case operated upon, the condition of the wound area before operation, and the condition, whether clean or infected, at the first and subsequent dressings. This report was read at a staff conference held every Friday morning after the ward visit, and any case of unexplained infection was referred to a committee to investigate and to report at the next conference.

While the earliest reports of our investigations were not kept in permanent form, we have a complete list of these reports since January 1, 1912.

The form in which these weekly reports were read was, first, the name of each patient with the clinical diagnosis; the anæsthetic used; the operator; the condition of the wound area, clean, infected, or border-line; the condition of asepsis at the first or subsequent dressings, "maintained" or "lost" in clean cases, "established" or "unestablished" in the infected. At the end of the report a summary was given of which the following is an example:

Total number of cases operated upon for the week ending July 11, 1912	34
Wound area clean	16
Wound area infected	13
Border-line cases	5
Asepsis maintained in	16

Asepsis lost in	0
Asepsis established (in infected cases)	4
Asepsis unestablished (in infected cases)	9
Deaths during the week	1

After the weekly report was read there also was added a summary of all cases since January 1, or July 1, in a given year, for six months or the period of service of each unit of the house staff. Without going more into detail I will submit the total records for each six months since January 1, 1912, together with a few brief comments which will give a fair idea of the infection occurring in our service for the past two and a half years.

During this period our technic may be summarized as follows: Whenever possible, a tub bath was given to the patient the night before operation, followed by shaving the wound area and the application of a soap poultice. After from four to eight hours this was removed, the part scrubbed with soap and hot water for five minutes, and a wet bichloride dressing applied. On the operating-table this dressing was removed by a sterile assistant, the parts rescrubbed for one minute, douched with ether, alcohol, and a 1-5000 solution of sublimate. The wound area was surrounded by sterile towels, and the entire body covered by sterile sheets. Sterile caps, gowns, and gloves were worn by all participating in the operation. The towels around the wound area were changed as often as soiled, and always before the insertion of the cutaneous sutures.

The method of sterilizing our material will not be described, as it did not differ in any material way from that employed in any modern surgical clinic. Suffice it to say that frequent bacteriological examinations de-

monstrated that our material was sterile. We did not at that time use the long-sleeved gowns completely covering our arms, and did not wear face-masks in ordinary cases. The reason for the latter omission was not that we disapproved of the plan, but because by a system of hand signals we were able to avoid talking during most routine operations.

Our technic was changed slightly in two classes of cases, operative treatment of fractures and open operations on the knee-joint. In these cases face-masks or helmets were worn, and nothing entered the wound which had been touched even with the gloved hand, all manipulations being carried out by instruments.

It will thus be seen that our technic was by no means an elaborate one, our aim being to keep it as simple as possible, and to make changes only when we felt by such changes that our results could be improved.

In the following tables we shall give the results of our method in clean cases, where infection could only be introduced during our operative procedures by some error in technic; also we will state the number of infected cases rendered sterile by our operative treatment.

I regret that we have not accurate records of the results in our border-line cases. While these often were read at our weekly conferences, they do not appear with any regularity in the records which have been preserved. This, while regrettable, does not in any way lessen the value of our report, for infections occurring in this group could never be attributed to technical errors, as the wound was always contaminated at some time during the operation. By border-line cases we refer to those in which an otherwise clean operative wound was at

some time in contact with an infected area or material, but in which it was possible generally to avoid gross infection by extra care. In this group we would include such cases as a gastro-enterostomy, an appendicectomy in which it was impossible to cauterize the stump before inverting it, and a cholecystostomy with infected bile.

SUMMARY OF RESULTS

Total cases from January 1, 1912, to July 1, 1912	457
Clean	250
Infected	139
Border-line	68
Asepsis maintained in	244
Asepsis lost in	6

Percentage of infection in clean cases, 2.4 per cent.

In discussing this report, our entire staff expressed surprise and disappointment. We all had the idea that our infections would not amount to more than 1 per cent of our clean cases.

During the next six months we adopted the plan of watching each other operate, Doctor Darrach, Doctor Russell, and the writer each acting as censor at different times, and critically observing every step of the operation. As the result of these observations we found that the suture and reserve instrument tables were too near the operating-table, and that the towels covering these were not infrequently contaminated by orderlies and unsterile nurses while bringing in the patient, handling hand-lights, or the cautery apparatus. While these contaminations were not directly to the instruments or suture material, it was possible, indirectly, to destroy their sterility by first handling the contaminated towels and later the instru-

ments, sponges, or other material. A number of other possible errors in technic were noted, and after consultation with Doctor Peck we rearranged the tables and fixtures in the operating-room, adopted new stoppers for our ligature flasks and water-bottles, had the patient transferred to the operating-table, prepared and draped in an adjoining room, and in a number of other ways altered our routine technic. These changes resulted in a decided improvement in our results, as will be seen in the following:

Total cases July 1, 1912, to January 1, 1913	445
Clean	234
Infected	131
Border-line	80
Asepsis maintained in	231
Asepsis lost in	3
Asepsis established in	60

Percentage of infection in clean cases, 1.2 per cent.

Total cases January 1 to July 1, 1913	474
Clean	213
Infected	148
Border-line	113
Asepsis maintained in	209
Asepsis lost in	4
Asepsis established in	102

Percentage of infection in clean cases, 1.8 per cent.

As the result of a staff conference at this time, we decided to adopt the long-sleeve muslin operating-gown, changed between each operation. While the writer has always been opposed to this procedure for the reason that accidental contamination on the skin of the bare arm was more easily felt than on even a light muslin covering, he yielded to the wish of the majority of the

staff, and the results since that change seem to indicate its merit.

Total cases July 1, 1913, to January 1, 1914	439
Clean	243
Infected	125
Border-line	71
Asepsis maintained in	239
Asepsis lost in	4
Asepsis established in	70

Percentage of infection in clean cases, 1.6 per cent.

In our investigation of the infections occurring in clean wounds prior to July 1, 1913, no facts were elicited which would enable us to ascribe them to factors other than technical errors occurring during operation. Just what these errors were was not always determined, but there was no evidence to indicate that the infection was due to conditions beyond our control.

In investigating the 4 infections occurring during the period from July 1, 1913, to January 1, 1914, it was found that 3 of the 4 cases occurred quite close together, and all had been operated upon under local anæsthesia. Bacteriological examination proved that the novocaine solutions were contaminated, as a result of faulty preparation. During this period the preparation of solutions for local infiltration anæsthesia was made in the drug department of the hospital, and they were delivered to the operating-room nurse ready for use. It will thus be seen that these 3 infections could not with reason be ascribed to errors in operating-room technic, as none of the staff or operating-room nurses had anything to do with the preparation of the infected solutions.

If, therefore, we exclude these 3 infections, the num-

ber of infections in clean cases during that particular six months would be reduced to 1, or 0.3 per cent.

Total cases January 1 to July 1, 1914	559
Clean	273
Infected	220
Border-line	66
Asepsis maintained in	273
Asepsis lost in	0
Asepsis established in	64

During the last two months of this period, the service was in charge of Doctor Charles N. Dowd, who succeeded the writer as senior surgeon to the First Division on May 1, but as the routine technic remained practically unchanged, the entire period of six months is included in this report.

Many years ago the writer established the custom of giving a prize to the house surgeon upon whose service of six months no clean case became infected. This prize has been won by three men, Doctor John H. Blue, now of Montgomery, Ala., the late Doctor William W. Miller, of Washington, and Doctor Armitage Whitman, of this city, whose service terminated July 1, 1914.

During the progress of these studies in technic, after accurate records were kept, we determined to widen the field of our observations somewhat and to include in our weekly reports the record of all catheterizations which occurred on our service. The reason for this will be patent to every hospital attendant, for we are all familiar with the increased suffering and prolonged convalescence which so often follows a cystitis resulting from perhaps a single post-operative catheterization. A weekly record,

therefore, was kept of each catheterization occurring on the service, with the name of the house officer or nurse who performed it, together with a report of the urinary analysis both before and after. While this plan was only recently adopted, and the number of observations is too small to be of much value and is therefore not included in our lists, it is gratifying to report that in no instance since records have been kept has catheterization resulted in infection.

During a part of the time covered by these observations a record of all cystoscopies was included in our weekly conferences. These were not introduced into this report for the reason that the records are imperfect during a part of the time, possibly because the results were invariably the same. It is, however, only fair to Doctor Edward F. Kilbane, our cystoscopist, to state that during a period of eight years he has made over 1,050 cystoscopies in the Syms operating-building on both private and ward patients, without infection of a sterile urinary tract occurring in a single instance, and without infection being transferred to a sterile ureter or kidney from an infected ureter or bladder.

Although not strictly germane to the subject, it may also be of interest to state that during the fourteen years which have elapsed since the writer's appointment to the attending staff of The Roosevelt Hospital not a single infection has occurred in a rather large series of arthrotomies of the knee-joint, undertaken for the repair of a fractured patella, ruptured quadriceps or its tendon, for the removal of joint mice, or injured or dislocated semilunar cartilages. This statement includes all cases, in both surgical divisions, in which an incision has been

made into the sterile knee-joint by any member of the staff.

To recapitulate briefly the facts bearing upon the main object of this communication, namely, to give the percentage of infections occurring in our clean cases, during each of the five periods of six months since January 1, 1912, it will be seen that for the first six months in 1912 the percentage of infection occurring in clean operative wounds was 2.4 per cent; for the second six months, 1.2 per cent. For the first six months of 1913, 1.8 per cent; for the last half of 1913, 1.6 per cent, if we include the 3 cases in which infection occurred as a result of using an unsterile solution of novocaine for local anæsthesia, for which none of the operating-room staff was in any way responsible; or 0.3 per cent, if these are excluded. For the six months ending July 1, 1914, no infection occurred in the 273 clean cases.

If, as seems fair, we exclude the 3 cases referred to above, during the year from July 1, 1913, to July 1, 1914, only one infection for which the operating staff could be held responsible occurred in 516 cases, or a little less than two-tenths of 1 per cent.

GASTRIC AND DUODENAL ULCER

A Review of One Hundred and Twenty Cases Operated upon at The Roosevelt Hospital by the Surgical Staff during the Past Five Years

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This report consists of a review of 120 cases of non-malignant ulcer of the stomach and duodenum which have been operated upon by members of the surgical staff at The Roosevelt Hospital between January 1, 1910, and January 1, 1915. Of the 120 cases, 73.3 per cent were duodenal and 26.7 per cent gastric. Of the 88 duodenal ulcers 71 were of the chronic indurated type, and 17 were acute perforations. Of the 30 gastric ulcers 17 were chronic non-perforative, and 13 acute perforations—an unusually high percentage of acute perforations for this latter group. Considering the group as a whole, 78.3 per cent were males and 21.7 females. In the duodenal group 83 per cent were males and in the gastric group 70 per cent.

It was of interest to note that all of the 17 acute perforated duodenal ulcers occurred in males, the ages ranging from 23 to 52. Of the 13 acute perforated gastric ulcers, 9 were males, and 4 females, the ages ranging from 23 to 49.

Taking all cases together, the number occurring in each decade from 20 years to 50 was almost equal, from

50 to 60 years somewhat less, and between 60 and 70 years fewer—but still a goodly number.

Chronic Duodenal Ulcer

Taking up the study of the cases by groups, there were 71 cases of chronic duodenal ulcer, in all of which the condition was verified by operation and posterior gastro-enterostomy was performed. In 44 the site of the ulcer was anterior, generally close to the pylorus; 19 were posterior, 2 multiple, 1 in the second portion of the duodenum, and in 5 the exact site was not stated.

In addition to the gastro-enterostomy, when possible, especially in the ulcers situated on the anterior surface of the duodenum, the area was enfolded by Lembert sutures, thus causing some degree of pyloric occlusion. In only one of the group was typical exclusion performed; this was a case which had bled repeatedly both before and after gastro-enterostomy—the von Eiselberg unilateral exclusion being performed in March, 1911—about a year after the gastro-enterostomy. In January, 1914, the patient was still having pain and occasional intestinal hemorrhages.

Appendicectomy was done in 25 of these 71 cases, cholecystostomy for gall-stones in 2 cases.

In studying the symptoms presented in this group it was found that hematemesis occurred in 13 cases, in 10 of which intestinal hemorrhage was also present. Intestinal hemorrhage occurred in 11 additional cases—21 in all. In 30 cases it was definitely stated that no hemorrhage occurred, and in the remainder the history failed to state. Hemorrhage occurred, therefore, in about 43 per cent of the observations, our experience

coinciding with that of so many others in showing that hemorrhage occurs in less than 50 per cent of the cases.

Pain of a characteristic type, occurring from two to four hours after meals, relieved by food or alkalines, was noted in 24 cases—less than 50 per cent of the cases in which the character of the pain was recorded. In 26 additional cases, pain, while present, was irregular in occurrence, bore no relation to the taking of food, or occurred within a short time after meals—*i. e.*, in more than 50 per cent of the records the pain was atypical rather than of the classic type attributed to chronic duodenal ulcer. Pain of some sort, however, was a constant symptom.

Vomiting at some time during the illness occurred in about half of the cases; but relatively few had persistent or frequent vomiting.

Records of gastric analysis in 40 of the cases showed free hydrochloric acid below 40 in 20 cases (50 per cent), between 40 and 60 in 13 cases, and above 60 in 7 cases. The total acidity corresponded fairly well to the percentage of free acid, 6 of the cases showing a total acidity above 90. In no case was absence of free HCl noted.

Observations of the red-cell count were made on 30 of the cases with the following results: Above 6,000,000, 4 cases; between 5,000,000 and 6,000,000, 8 cases; a total of 12 cases, or 40 per cent, with some degree of polycythemia; 18 cases (60 per cent) had a count of 5,000,000 or less. In estimating the value of polycythemia as a diagnostic sign in chronic duodenal ulcer, one must of course allow for secondary anæmia due to repeated hemorrhage, but, even considering this, our observation on this series would seem to indicate that this sign is of only limited diagnostic value.

Of the 71 cases, 65 recovered and 6 died—a mortality of 8.4 per cent. This relatively high mortality is partly due to the fact that several of the cases were very poor operative risks on account of age, extreme cachexia, and alcoholism. Only 3 of the deaths seemed the direct result of the gastro-enterostomy *per se*, and one of these was a man of advanced years who was much depleted by repeated intestinal hemorrhages. The causes of death in detail were as follows:

First Case (No. B 3332).—Embolic pneumonia and pulmonary abscess, with death on the nineteenth day after operation, in a man 64 years of age.

Second Case (B 4135).—Acute gastric dilatation, persistent vomiting; died on the sixth day after operation, following a secondary operation performed on the fifth day.

Third Case (B 4644).—Post-operative shock and exhaustion, death eight hours after operation. Supposed ulcer in second portion of duodenum; diagnosis never fully proven. Marked cachexia, which was perhaps due to some undiscovered cause. No autopsy.

Fourth Case (A 6001).—Persistent vomiting; entero-enterostomy on the fourth day; death on the fifth day after primary operation.

Fifth Case (A 3077).—An alcoholic man 38 years of age; broncho-pneumonia; death on the fourth day.

Sixth Case (B 3380).—A very anæmic, cachectic man, 44 years of age, with large multiple ulcers of the duodenum and a complicating megacolon; operated upon under diagnosis of malignant disease of colon; massive induration about ulcers thought to be neoplasm, but not proven at autopsy. Wound broke open on seventh day; death on ninth day.

In estimating the late results, we have had some difficulty in following hospital cases satisfactorily, and

our efforts in this group have not covered a sufficient period of time to be complete. Definite late reports have been obtained in 52 cases, in all but 6 of which the late results have been most satisfactory. One of these, already referred to, still has pain and hemorrhage—the case in which secondary pyloric exclusion was performed. Another made a slow convalescence, but finally a satisfactory one, after secondary entero-anastomosis for recurring vomiting. Four others are much improved, but still have pain and indigestion at times. Two of the 46 cases were traced a few months only, when 1 returned home to Italy and 1 to Russia.

Many of these cases have been followed from two to four years, and their restoration to comfort and health, often after years of suffering from the effects of the ulcer, has been most striking and satisfactory. Efforts are being made to follow others of the group, but many are hopelessly lost through change of address in the poorer sections of the city. For the past two years an improved system of following up cases after discharge from the hospital has enabled us to keep better track of the late results.

Chronic Gastric Ulcer

The 19 cases of chronic gastric ulcer in the series gave less satisfactory results than the duodenal. Gastro-enterostomy was performed in 12 of the cases; partial gastrectomy in 3; excision of the ulcer without gastro-enterostomy in 2; cautery puncture with gastro-enterostomy in 1, and exploratory celiotomy in 1 case. There were 3 deaths in the series, and a fourth case returned to the hospital shortly after discharge, with pneumonia, from which he died.

Twelve of the ulcers were on the lesser curvature at some distance from the pylorus; 2 were on the posterior wall; 4 were pyloric, and in 1 the position was not stated.

Hematemesis had occurred in 10 cases, was absent in 7, and not mentioned in 3.

Pain was a constant symptom, generally made worse by the ingestion of food and relieved by vomiting. It varied in intensity, but there were seldom free intervals lasting days or weeks, as is so often the case in duodenal ulcer. Pain was generally more constant and severe than the pain of duodenal ulcer.

Gastric analysis in 12 of the cases showed free HCl 40 or below, in 8 cases, 60 in 2 cases, and absent in 2 cases.

These findings again emphasize the fact that the results of gastric analysis are of only limited diagnostic value.

Our series of gastric ulcers is quite too small to establish rules of management for the different types; but, in general, I believe that ulcers near the pylorus, especially those associated with a good deal of induration which are difficult to differentiate, clinically, from carcinoma, should be excised—*i. e.*, pylorectomy or partial gastrectomy should be performed. When situated on the lesser curvature near its middle, or at the cardiac end, one may consider: (1) excision (V-resection with suture) with or without gastro-enterostomy; (2) cautery puncture of the ulcer, as suggested by Balfour, with closure of the hole by suture, with or without gastro-enterostomy; (3) gastro-enterostomy alone, without direct attack on the ulcer.

In our series 2 cases were treated by V-excision

without gastro-enterostomy: 1 has made a perfect recovery, is well two years after the operation, and has gained 20 pounds; the other has had persistent pain and indigestion, was readmitted three years after the primary operation, but refused the secondary operation which was advised.

One recent case of penetrating indurated ulcer high on the lesser curvature was treated by cautery puncture (Balfour) with gastro-enterostomy: the cautery point was plunged through the centre of the ulcer, and by burning around the edges of the opening the entire ulcer was practically ablated; the opening left in the gastric wall was closed by suture, reinforced by a tier of Lembert sutures, and, finally, by the fatty tissue from the lesser omentum. The procedure is simple, quick, and I was much impressed with it as a means of dealing with high lesser curvature ulcers where V-excision is so difficult. Even if one does not succeed in cauterizing out all of the ulcer, the reparative process thus excited should greatly hasten its healing. The patient was quite free from symptoms when last seen.

I believe it is wise to do gastro-enterostomy in every case, whether cautery puncture, V-excision, or any direct treatment of the ulcer is used; for it is quite possible that the chemical change in the gastric juice and contents, as pointed out by Patterson, has at least some influence favoring healing of the ulcer. One case of ulcer, quite close to the cardia, in which exploratory celiotomy only was done one year ago, has continued to have pain and indigestion, and I have regretted that gastro-enterostomy was not done in this case. I was not at the time familiar with the method of cautery puncture, and was under the impression that gastro-

enterostomy was practically useless in ulcers near the cardia.

Of the 3 cases treated by partial gastrectomy, 2 recovered and 1 died of shock—a difficult case, with the ulcer situated far up on the lesser curvature. Both of the cases which recovered are quite well and free from gastric symptoms two years and six months and two years and nine months after operation, respectively.

Of the 12 cases in which gastro-enterostomy alone was performed, there were 3 deaths: 1 from persistent vomiting which secondary operation failed to relieve; 1 from pneumonia with pulmonary embolus on the eighth day. The third fatal case left the hospital recovered from his operation, but returned in a few days ill with pneumonia, from which he died.

Of the 9 cases which recovered, 5 are known to be free from gastric symptoms at five and one-half years, four and one-half years, two years, seventeen months, and six months after operation. Two continue to have pain and indigestion at twelve months and eighteen months after operation. Two of the earlier cases we have been unable to trace. The number of cases in this group is too small and the end results too imperfectly traced to draw conclusions of much value, but it is quite evident that the results of gastro-enterostomy for gastric ulcer, without excision of the ulcer, are much less satisfactory than in duodenal ulcer. We have had no late development of carcinoma in a gastric ulcer as far as we know, though it is quite possible that it may have occurred in some of the untraced cases. It is also possible that it may have been present in the case which returned (B 1479) two years and nine months after V-excision with persistent symp-

toms and marked cachexia, and who refused to remain in the hospital for further investigation or operation.

Perforated Duodenal Ulcer

Of the 17 cases of acute perforated duodenal ulcer, 2 died before leaving the hospital, 1 of pneumonia on the seventeenth day after operation, and 1 after a secondary operation for subphrenic abscess twenty-two days after the primary operation. Two others died shortly after leaving the hospital, 1 of pulmonary tuberculosis lighted up by the illness and operation, and 1, a few days after discharge, of hemorrhage from an ulcer situated on the inferior wall against the head of the pancreas. In this latter case the primary operation showed a large, localized abscess in the upper abdomen containing gas; the site of the perforation was not located, and any attempt at closure was impossible.

No case died of extension of the peritonitis. In 4 of the cases simple closure of the ulcer without gastro-enterostomy was employed, with 1 death; in 1, drainage of a large localized abscess, without suture (the fatal case just cited). In 12 posterior gastro-enterostomy was done in addition to closure of the perforation, with 11 recoveries and 1 death (pneumonia on the seventeenth day). While the series is too short to be conclusive, gastro-enterostomy does not seem to have had an unfavorable influence on the mortality.

As to the time which had elapsed between symptoms of perforation and operation: of the fatal cases 1 had had symptoms for three days, with moderate leakage (death from pneumonia), 1 for five hours (death from subphrenic abscess). Of the 15 cases which recovered from the

operation, 9 were operated upon within twelve hours, 4 in twelve, twenty-seven, thirty-one, and forty-eight hours, respectively; and in 2 the history indicated perforation several days before, with partial sealing by adhesions and fresh leakage a few hours before operation.

Of the 17 cases, 10 were closed without drainage, and 7 were drained. One of the fatal cases was drained, the other was not.

One can conclude from this study that cases of acute perforated duodenal ulcer, if operated upon promptly, should rarely die of peritonitis; that drainage can safely be omitted in the average case, but should be used if the closure of the perforation is insecure, or if a walled-off abscess has formed, making further pus formation probable; that gastro-enterostomy should not increase the mortality, if used in properly selected cases.

Opinions are divided as to the wisdom of performing gastro-enterostomy in the presence of acute perforation, but it seems rational to suppose that a permanent cure of the ulcer would be aided thereby, though undoubtedly many undergo spontaneous healing after perforation and simple suture, and remain well.

The extent of the peritonitis present at the time of operation varied from a moderate amount of fluid in the upper abdomen to a generalized process involving both flanks and the pelvis. Drainage of the pelvis or flanks was resorted to in 1 case only.

Of the 12 cases which we have been able to trace, 7 were well and free from gastric symptoms at four years and four months, four years, four years, three years and four months, two years and six months, two years and two months, and two years and two months after operation. Five of these had gastro-enterostomy performed.

Five cases, 4 of which had gastro-enterostomy performed, still suffer from pain and indigestion at times; 1 of them was well for over three years, but has had some recurrence of symptoms for the past year; 3 are able to work steadily with only occasional pain and indigestion (operated upon three years and nine months, seventeen months, and thirteen months ago); and 1 operated upon two years ago without gastro-enterostomy has suffered more or less constantly ever since.

One case only we have been unable to trace.

Perforated Gastric Ulcer

Of the 13 cases of perforated gastric ulcer, 7 recovered and 6 died. The 6 fatal cases all died of peritonitis, 1 having pneumonia, 1 subphrenic abscess and pleurisy, and 1 delirium tremens, in addition to the peritonitis. Four of the 6 were late operations, from one to five days after perforation, with peritonitis already well developed. The other 2 were operated upon twelve and thirteen hours, respectively, after perforation. Both had extensive leakage and peritonitis. Gastro-enterostomy was not performed in any of the fatal cases, but was done in addition to closure of the ulcer by suture in 5 of the 7 cases which recovered. In 5 of the 13 cases the perforation was prepyloric; in 5 on the lesser curvature, at some distance from the pylorus; in 3 (2 of which were advanced cases of peritonitis, and fatal) the site of the perforation was not accurately located, though it was believed to be gastric.

Of the 5 cases which recovered, 3 were operated upon about six hours and 1 twelve hours after perforation; in 2 there were well-localized epigastric abscesses; and in 1 the perforation was partly sealed by adhesions.

For the prepyloric group of perforations, indications for gastro-enterostomy at the time of the primary operation would seem to be the same as in duodenal ulcers; *i. e.*, when the patient is in good condition and future pyloric obstruction probable, gastro-enterostomy may be performed.

In perforation on the lesser curvature or anterior wall, the need of it is less evident, and simple closure by suture is usually sufficient. It is better to leave the gastro-enterostomy for a future time than to do it under conditions which greatly increase the immediate operative risk.

It is frequently stated that symptoms of acute perforation often come out of a clear sky without previous symptoms of gastric trouble: of the 17 cases of duodenal perforation, all but 2 gave a history of previous indigestion, though in 4 of these the history was a short one of from one to two weeks. In the gastric group practically all of the cases had had previous ulcer symptoms.

Radiographic findings are becoming of more and more aid in the diagnosis of chronic ulcers, both gastric and duodenal. In gastric ulcers, especially, positive evidence is often obtained in cases where other signs and symptoms are very doubtful. Our records are too incomplete to attempt to tabulate the findings in this series, but it is enough to say that all suspected cases are now examined in this way as a routine, and not only in many cases is the diagnosis definitely established, but negative explorations are less frequently done than was the case before this valuable aid in diagnosis was available.

In conclusion, I wish to thank my colleagues on the surgical staff of the hospital for permission to include their cases in this report.

DISEASES OF THE PANCREAS

A Study of Thirty Cases Treated by the Surgical Staff of The Roosevelt Hospital

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Diseases of the pancreas are among the most uncanny conditions which we have to deal with. Although the pancreas has a duct, it has a twofold structure. One of the parts, that connected with the Islands of Langerhans, is associated with the ductless glands, and its effect on the internal economy may be as insidious as that of the true ductless glands. The other part produces an important and complex secretion, the pancreatic juice, and interference with this secretion also has a profound constitutional effect.

It is exposed to infection from the bile duct, which usually passes through it, from the duodenum into which it empties, from the lymphatics which are closely connected with those of the biliary system, and from the blood. Its soft structure gives little resistance to inflammation which has once started. Its inaccessibility and the obscurity of its functions make diagnosis of its lesions very difficult.

When the inflammation is acute, a fatal termination may be reached within a few days, or even a few hours, from the beginning of symptoms. When it is subacute,

or chronic, the patient may feel the debilitating effect of the disease before its location can be determined.

The classical paper of Fritz (1889) appeared at a time when abdominal surgery was becoming established, and attracted attention to this condition when operative observations could be made on patients during the course of the disease. Since that time a very large number of surgeons and pathologists have made exhaustive studies of the subject, but have not succeeded in making a clinical picture as distinct as that which accompanies diseases of most of the other organs.

In studying The Roosevelt Hospital surgical histories for the last five years we find 30 cases of pancreatic disease, which may be divided as follows:

Acute pancreatitis	9 cases.
Pancreatic abscess	2 "
Chronic pancreatitis	15 "
Pancreatic cysts	4 "

Acute Pancreatitis

The acute cases are the most uncanny of all; there were 4 deaths in the 9 cases. They may be summarized as follows: A man 48 years old, who was admitted to the hospital on the night of February 2, 1910, had for a week suffered from attacks of pain in the epigastrium; these had usually been relieved by vomiting; he had vomited "coffee-ground" material. On the night of admission he was seized with prostrating, agonizing epigastric pain, which was not relieved by vomiting. He seemed extremely ill. Pulse 140. Resp. 24, shallow. Temp. 100. He had general abdominal rigidity most marked in the

epigastrium. Operation was done at 2 o'clock A. M.; serosanguineous fluid appeared on opening the abdomen; there were numerous small areas of fat necrosis on the lesser omentum and upper part of the great omentum. The pancreas was large and boggy, friable and necrotic. Access was obtained to it through the gastro-colic omentum and a drain introduced. He died the next day, temperature going from 98.4 to 106.4 just before death. On autopsy, the head of the pancreas was found to be necrotic and very friable; its body contained smaller necrotic areas and its tail was not involved. The stomach contained blackish fluid and the duodenum had a patch of bloody fibrinous exudate. The spleen showed acute degeneration. The omentum and mesentery showed fat necrosis. There were no biliary or pancreatic stones.

Another case, a woman 44 years of age, who had suffered from an attack of epigastric pain five years previously, came to the hospital twenty-four hours after the beginning of an attack, which was really severe. She vomited persistently and had soreness, pain, and distention in the epigastrium, and was very much prostrated—pulse 128, temp. 99.6, resp. 24, leucocytes 19,000, polymorphoneuclears 89 per cent. Operation was done without delay, numerous spots of fat necrosis were found, and the pancreas was found to be swollen, soft, hemorrhagic, and necrotic. It was drained through the gastro-colic omentum, but her temperature rose to 106.2, and she died two days later.

The third fatal case showed less acute symptoms, but had necrosis of the head of the pancreas. This was abundantly drained, but he died six days after admission.

The fourth fatal case, a man 62 years of age, was operated upon forty-eight hours after the beginning of the attack of vomiting and epigastric pain. He had fat necrosis, swollen soft head of pancreas, and gall-stones, and was treated by cholecystostomy, pancreatotomy, and drainage. He seemed likely to recover for about five days, then he developed suppurative parotitis, pneumonia, general septicæmia, and died.

Any one who studies these cases must be impressed with the overwhelming virulence of inflammation which quickly leads to necrosis and possibly hemorrhage in this deep-lying organ, and is accompanied by such profound constitutional prostration.

Of the remaining 5 cases of acute pancreatitis, 4 recovered and the fifth is still under treatment. There was an average time of three and one-half days between the beginning of acute pain and their operations. This time did not differ materially from that of the fatal cases, but the inflammation was less severe in type. *In one instance* the pancreas was large, soft, hemorrhagic and slightly necrotic. *In another*, its head was very soft and œdematous. *In the third* it was enormously enlarged, but without fluctuation. *In the fourth* the head of the pancreas was as large as a golf-ball and hard, the duodenum was congested and œdematous, and much slightly sanguineous serum was present. *In the fifth*, the pancreas was slightly nodular and firmer than normal, and there were enlarged lymph nodes along the common bile duct.

Fat necrosis was recorded in 3 of the cases. Apparently 2 of these cases would have quickly gone to fatal termination excepting for the prompt operation. The others

seem still to have had fair margins of safety when their operations were done.

Three of them were treated by pancreatotomy and drainage, one by cholecystostomy, and one by both of these procedures.

In the entire group of 9 acute cases, gall-stones were found 3 times. This does not differ materially from the 40 per cent which Nordmann estimates as the proportion of gall-stones which accompany cholecystitis or gangrene of the pancreas. We must accept the fact that the pancreas is capable of severe inflammation independent of the proximity of the bile duct. Carwardine and Short have reported fatal acute necrotic pancreatitis in an accessory pancreas which was situated in the wall of the upper jejunum.

Pancreatic Abscess

The two patients with pancreatic abscess showed less acute inflammation than those mentioned in the previous group, but they were both very ill. They were, respectively, 30 and 34 years of age, both multiparæ, both had suffered repeated attacks of epigastric pain and jaundice in previous years, and both had come to the hospital on account of great epigastric discomfort and nausea. On operation, each showed fat necrosis and the elastic head of the pancreas pushing forward against the gastrocolic omentum above the transverse colon. Blunt instruments easily penetrated the pancreatic tissue and liberated pus.

One had multiple gall-stones, the other multiple pancreatic stones. Cholecystostomy and pancreatotomy and drainage were done in both cases, and both recovered.

The most remarkable thing about them was the way in which the abscesses drained. Tubes were inserted in their cavities, a little packing was put about them, and an "up-hill" drainage went on without infecting the surrounding tissue.

The infection must have been of moderate virulence.

The culture from the pus in one case showed staphylococcus pyogenes aureus; no culture was made from the other.

Similar satisfactory drainage occurred in 2 cases which Doctor Brewer reported from this hospital in 1907, and 1 of these was even more remarkable in that the drainage tube went below the transverse colon instead of above it, and drainage by this sinuous tract was satisfactory. Culture from the pus showed bacillus typhosus.

Concerning the rarity of pancreatic abscesses it may be interesting to note that in Von Bergmann's *System of Surgery* it is stated that "at least 18 cases" had been reported up to 1901, a very small number when we consider that 4 cases have been reported from our hospital in eight years.

Robson and Cammidge refer to abscess as one of the developments of subacute pancreatitis, and refer to reports of 14 cases with a mortality of 35 to 60 per cent.

Of the 4 cases here referred to, 2 are well, respectively, ten and twenty-two months after their operations. One has died during the eight years which have intervened since her operation. The fourth, who was well on leaving the hospital, cannot be traced.

The presence of calculi in both of our patients suggested that the blocking up of pancreatic secretion was an element in abscess production.

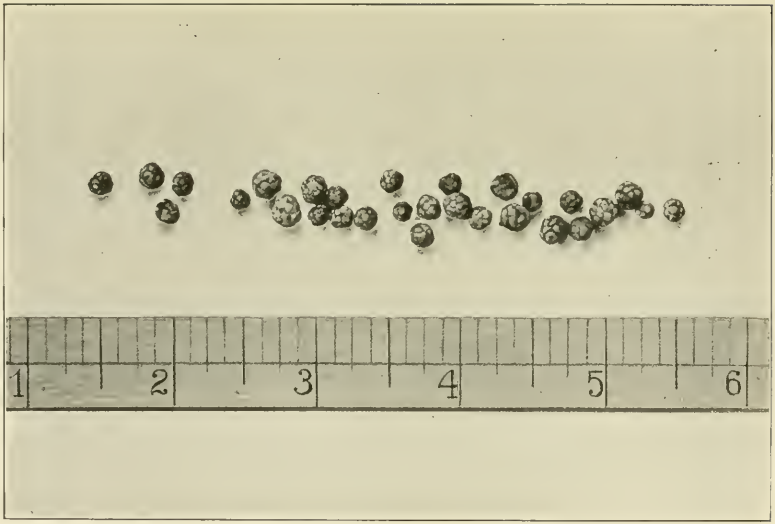

FIG. I. Pancreatic calculi found in pancreatic abscess. Thirty-five similar calculi had been recovered from the stools, at different times, before operation. Their passage was preceded by severe epigastric pain.

The *pancreatic calculi* are uncommon enough to call for especial attention.

In this instance there were multiple, mulberry-like nodules about $\frac{3}{16}$ inch in diameter. Their appearance is shown in the accompanying plate (Fig. 1). They were examined at the Harriman Research Laboratory, and reported as mostly cholestrol and cholectrol with almost no ash; under X-ray they cast no shadows.

Oser in 1898 and Kretz in 1913 have given careful descriptions of pancreatic stones.

In comparison to gall-stones they are very rare. Kretz did 3,000 autopsies before he found one case, while Guidiceandrea in 1896, after a very careful search of the literature, collected only 48 cases, to which he added 2. The stones are usually small and multiple. They lie in the ducts and are not facetted, since local dilatation of the ducts occurs and they lie isolated in the resulting ectasic cavities. They are usually of light color, only moderately firm consistency, and contain organic material and salts of lime, soda, and manganese.

Bacterial infection is believed to be an element in their formation. Since they are contained in isolated cavities, they are seldom found in the stools.

Chronic Pancreatitis

The patients in this group did not present such vivid clinical pictures as those in the preceding groups, but one need not belittle their importance. If acute inflammation of the pancreas can lead to such overwhelming results, chronic inflammation might well be expected to exert considerable influence.

The data for study are not so definite as in the acute cases. Fat necrosis, pancreatic hemorrhage, necrosis of pancreatic tissue, and pancreatic abscess are conditions so definite as to leave very concise impressions on the minds of the observers.

The lesions of chronic pancreatitis, however, are far less definite. They are usually found at the time of operation in patients who have upper abdominal symptoms more severe than would be explained by the conditions of the biliary system or the stomach or duodenum. The pancreas is found to be harder and larger than normal, but it is commonly examined through the gastrocolic omentum, and such examination is not really satisfactory. In all of the 15 cases the head of the pancreas was enlarged and hard, in 2 instances this hardening seemed to extend throughout the organ; in 8 instances a nodular feel is recorded; in 6 instances the gall-bladder was definitely thickened; in 1 instance both the gall-bladder and the common bile duct contained pus from which staphylococcus pyogenes aureus was cultured. In only 1 instance were gall-stones present.

It is possible that other patients who had gall-stones also had chronic pancreatitis, and the fact has not been recorded in the hospital histories because the gall-stones seemed to explain the symptoms, and the change in the pancreas could not be satisfactorily determined by palpation.

Symptoms.—8 patients had had symptoms two years or more; 2 of them, twenty years; 1, sixteen years; 1, six years; 2, three years; 3, two years; 1, five months; 4, less than three months. In 2 the record is incomplete. In 7 patients there is a record of jaundice. Tenderness is

recorded in 8 cases. In none of the cases was there a palpable mass.

Cholecystostomy was done in 11 cases.

Choledochotomy in 2 cases.

Cholecystectomy and choledochotomy in 1 case.

Cholecyst-duodenostomy in 1 case.

Exploratory celiotomy in 1 case, from whom a specimen was removed for examination.

There was 1 operative death, it was in a patient who also had tubercular peritonitis.

Later histories have been obtained from all of these patients. Nine of them are in excellent health at the time of this report; 4 of these 9, however, have had periods of discomfort since their operations. One patient was well for seven months; she then moved and her present condition cannot be learned. Two patients still have periods of epigastric discomfort and nausea. Two patients died in the year 1914; 1 had diabetes and jaundice, the other had occlusion of the duodenum from cicatricial bands, and at the autopsy calculi were found in the pancreatic ducts.

This good proportion of fairly satisfactory recoveries indicates a considerable recuperative power in the pancreas, better than one would believe on reading the records of those surgeons who at secondary operations have still found the pancreas enlarged and hardened.

Pancreatic Cysts

The cysts of the pancreas were 4 in number. They pressed forward between the stomach and the transverse colon.

One of them only contained 200 c.c. of fluid, the others were large, containing respectively 1½, 2, and 1½ litres of fluid.

The small one was apparently a cyst adenoma. It had in its wall fibrous and muscle tissue, and was lined by a layer of flattened epithelial cells, and there was adenomatous tissue about a flattened duct which was seen in the microscopical sections. The common bile duct was incorporated in its pedicle. The other 3 apparently came from the breaking down of pancreatic tissue, accompanied by duct occlusion and the accumulation of fluid. They would thus be classified as "false cysts."

One of them illustrated this formation to a remarkable degree: at the time of her first operation, which was primarily for gall-stones, the head of the pancreas was found to be greatly enlarged. It was nodular, of firm texture, and pushed the pylorus and first portion of the duodenum upward; the gall-stones were removed and the gall-bladder drained. In the third week following, an epigastric mass appeared. On the twenty-second day it was opened and found to be a large thin-walled cyst, which pushed forward between the stomach and transverse colon. It contained 2 litres of cloudy, light amber fluid in which were many flakes and particles of necrotic pancreatic tissue. Almost the entire pancreas was apparently gangrenous, and was represented by an irregular, loosely attached mass of friable grayish tissue. It was treated by marsupialization and, after many months, healing resulted and good health was secured. Pancreatic digestive action was obtained from the fluid which came from the sinus.

The third case, a man 44 years of age, had noticed an epigastric mass for two weeks; it was tender and transmitted the aortic pulsations. On operation 1½ litres of dark amber fluid were liberated, much partially digested blood was present, and necrotic tissue which on gross and microscopical examination appeared to be a part of the pancreas. The wall of the cyst was apparently the posterior layer of the peritoneum. Marsupialization was followed by recovery, and the patient is now in excellent health. Chemical examination of the fluid showed a proteolytic ferment. Tyrosin crystals were precipitated.

The fourth case, a woman 30 years of age, had shown symptoms for a longer period. For three years she had had attacks of severe epigastric pain, increasing epigastric pulsation had been present for a year, and symptoms of diabetes for six months. Operation showed a cyst between the stomach and colon. It was connected with the head of the colon and contained 1½ litres of turbid yellowish fluid. After marsupialization a good recovery followed. She has had occasional relapses of pain, but is now in excellent health.

Summary

In studying this entire series of pancreatic lesions, one must be impressed with the great variations in severity of symptoms, also with the easy gradations between the different groups.

Excepting the one case of cyst adenoma, the patients all seemed to have different grades of the same kind of inflammation. A slight hardening of the head of the pancreas represented the mildest form. A quickly progress-

ing necrosis represented the severest form. The occurrences of hemorrhages, abscesses and pseudocysts are variations which might be expected. They were dependent on the special peculiarities in the development of the inflammation.

Epigastric pain was the most characteristic symptom. In the severe cases this was overwhelming and was accompanied by great prostration, usually without much early elevation of temperature. In the milder cases these symptoms were correspondingly mild. Epigastric rigidity was usually present, epigastric mass occasionally present.

The drainage of the biliary system was usually helpful, and sometimes curative. The direct drainage of the pancreas itself is very desirable in the more severe cases.

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A STUDY OF ONE HUNDRED AND TWENTY CASES OF GOITRE

Operated upon by the Surgical Staff of The Roosevelt Hospital

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The technic of goitre operations has become well established, and surgeons in general are familiar with its details.

The indications for operation, however, are still the subject of general discussion. They are far from being determined. It is manifest that surgery offers a cure for many of the ailments which are associated with enlargement of the thyroid gland. It is equally manifest that it does not offer a cure for all of them.

This study of 120 cases is undertaken in the hope of adding a little to our knowledge of the indications for operation. All of the patients have been operated upon by the members of the surgical staff of The Roosevelt Hospital—93 of them within the hospital between January 1, 1910, and January 1, 1915—27 of them by the writer while on duty elsewhere. Subsequent histories have been obtained from all but 8 of these patients.

The questions which one considers in studying a patient who seeks surgical aid for goitre are:

I. Are there symptoms of Graves's disease?

II. Are there disturbing symptoms of pressure on the trachea or other adjacent tissues?

III. Is the deformity from the growth important?

IV. Is there a threat of malignancy in the rate of growth or the manner of its extension?

We may consider these topics in the order given above.

Group I. Patients Giving Evidence of Graves's Disease. Total number 55.

Although the terms Graves's disease, Basedow's disease, Exophthalmic goitre, Hyperthyroidism, and Thyrotoxicosis are used as synonyms and convey a fairly definite mental picture, the group which they represent may well be subdivided for surgical consideration.

A. Those who have the symptoms of this group added to those of pre-existing goitre.

B. Those who have symptoms in moderate degree but without history of pre-existing goitre.

C. Those who have the symptoms in extreme degree.

A. There are many patients who have long had almost symptomless simple goitres who unexpectedly develop increased heart action, lack of mental poise, undue fatigue and possibly one or more of the associated symptoms such as tremor, digestive disturbance, loss of weight, undue sweating.

When they seek surgical advice, it is not always easy to tell whether these symptoms are due to overactivity of the thyroid gland or to other influences. Their appearance, however, is fairly characteristic, and they may be classed as patients with mild grades of thyrotoxicosis. There were 16 such patients in this group. The average duration of their thyrotoxic symptoms was seven months.

The average previous duration of their noticeable thryoid enlargement was six and one-third years.

Hemithyroidectomy was done for all of them.

One had had a previous ligation of the superior thyroid arteries.

One of these patients has been followed twelve years; 5 have been followed into the fourth year; 3 have been followed into the third year; 4 have been followed into the second year; 2 less than a year.

All have shown definite improvement and are attending to ordinary duties. One has associated pituitary disease, 4 have still to be careful about overexertion, and the remaining 10 are in excellent health.

B. There were 10 cases in the second group. The average duration of their symptoms was six and eight-tenths months. They had increased heart action, undue fatigue, lack of mental poise, and some of them showed moderate digestive disturbance or sweating, slight exophthalmos or moderate tremor.

Five of them were treated by ligation of the superior thyroid arteries, the other 5 by hemithyroidectomy.

One of these patients has been followed into the sixth year; 2 into the fifth year; 2 into the fourth year; 2 into the third year; 2 respectively nine and six months. 2 have shown only moderate improvement; 7 are in excellent condition, and are attending to their ordinary duties. One of these 7 may be particularly mentioned, an adult whose superior thyroid arteries were ligated in 1910, and his inferior thyroid arteries at later periods. His symptoms persisted for about three years, and then disappeared.

C. Those with extreme symptoms, 29 in number,

presented the most difficult problems, many of them were desperate surgical risks; still, their relief was undertaken in spite of their desperate condition, and some of the very worst patients were much benefited; others succumbed. There were 6 deaths among these patients, making the mortality rate $10\frac{9}{19}$ per cent among the thyrotoxic cases. If we exclude patients with cancer the mortality rate among the entire group of goitre cases was $5\frac{1}{19}$ per cent. This death-rate could easily have been reduced almost to nil by refusing to accept these very severe cases as surgical risks.

If we study the fatal cases in detail, we note that 3 of them were in such wretched condition that only ligation of the superior thyroid arteries was attempted, yet 1 of them died on the table during an attempt at this very simple procedure, and the other 2 died, each two days after it, although various safeguards had been adopted.

Of the 3 deaths which followed hemithyroidectomy, 1 came from œdema of the lungs, and 1 from pneumonia, each two days after operation; the third came eighteen days after operation, with symptoms of profound psychic disturbance. All of these patients had progressed to the stage of degeneration of the internal organs. In these very far advanced cases the mortality rate is sufficient to warn operators against accepting the patients as surgical risks. It is better to use some form of palliative procedure for them—rest, X-ray, boiling-water injections, or some similar procedure in the hope that they may be brought to a condition for ligation of arteries or hemithyroidectomy.

Possibly operation under local anæsthesia would have

been better for the patients who developed pneumonia and œdema of the lungs. By its use, some of the other very serious cases were safely carried through their operations. The procedure, however, is accompanied by considerable shock to the patient, and has its own mortality rate.

In some instances rectal anæsthesia was used with marked success. The patients consented to operation, but the appointed day was not stated to them. One hour before operation, ¼ gr. of morphine and $\frac{1}{150}$ gr. of atropine were given hypodermatically. One-half hour before the operation, a mixture containing ether (6 oz.) and mineral oil (2 oz.) was injected into the rectum, which had been previously emptied by enema. This was done in the ward. The patients then went to sleep and passed into a condition of surgical narcosis, in this state were taken to the operating-room, and after their operations were returned to their beds before fully emerging from anæsthesia. This procedure probably reduces the mental strain to the minimum, but it must be under the direction of a skilled anæsthetist, and the mixture must be withdrawn from the rectum as soon as he believes enough has been absorbed. As yet, it has not been used on the most severe cases.

Results.—The result of operation on these severe cases is worthy of note.

A post-operative report has been obtained from 22 of them: 1 after eight years; 1 in the fifth year; 4 in the fourth year; 8 in the third year; 6 in the second year; 1 in the eighth month, and 1 in the third month.

One of them may especially be mentioned, a girl of 23 years, who in January, 1913, applied for relief of

symptoms of Graves's disease which had been increasing for more than a year. She had a moderately enlarged thyroid, rapid pulse—120 to 125, marked tremor, severe exophthalmos, nervous irritability and restlessness, and had lost weight and strength.

Ligation of both superior thyroid arteries was done in the expectation of further procedure later, but her improvement was so marked that no further procedure was done. Seven weeks after her operation her pulse was 92, she had gained 8 pounds, she was less nervous, and her exophthalmos was less noticeable. Ten months after her operation she had gained 25 pounds and was working regularly as a clerk and book-keeper. Fifteen months after her operation she had gained 38 pounds, had continued to work regularly, and was perfectly strong and well. No exophthalmos was noticeable and no thyroid enlargement. Pulse 72. A similar condition is reported at the present time, two years and two months after operation. This was the most remarkable case of the series, but there were others almost as remarkable.

The notes on the other cases may be given separately:

No. 2. Two and one-half years after operation. Her physician says, "Entirely cured."

No. 3. Three and three-twelfths years after operation. Mother says, "In splendid health; gained 17 pounds after operation."

No. 4. One and one-twelfth years after operation. Is "well" and is now doing her work as trained nurse.

No. 5. Eight years after operation. Is living in comfort, but has to avoid fatigue.

No. 6. Three and three-twelfths years after operation. Living in Albany. Writes that she has been in excellent health ever since

operation, has gained 20 pounds, does her own work except washing, and never felt better than now.

No. 7. Two and six-twelfths years after operation. Very much better than she has been for years, but avoids severe exertion.

No. 8. Three and six-twelfths years after operation. Is married and does her own housework, is much better than before operation, pulse 90, sweats easily, has moderate exophthalmos.

No. 9. Four and seven-twelfths years after operation. Has recently been through operation for very severe attack of suppurative appendicitis, and is in excellent condition.

No. 10. Three and eight-twelfths years after operation. "Poorly" for six months after operation, then improved; has worked steadily and is now strong and well.

No. 11. Four and four-tenths years after operation. Her symptoms increased after her first operation (ligation superior thyroid arteries). Hemithyroidectomy done seven months ago. Is now in good health and working in training school as pupil nurse.

No. 12. One and nine-twelfths years after operation. Has remained of normal weight, has worked much of the time; exophthalmos less, but pulse still runs to 150 on excitement.

No. 13. Three and one-twelfth years after operation. Has had two children in this interval, and is in good health.

No. 14. Two and six-twelfths years after operation. "Seems well," attends to ordinary duties.

No. 15. Two and one-twelfth years after operation. Her physician states that she is much improved and enjoys fair health.

No. 16. Two and four-twelfths years after operation. Does her own housework but is thin and nervous, has four children, oldest eight years, youngest one and one-quarter years of age.

No. 17. One year after operation. Slight tremor one month after operation, but a year later seemed well.

No. 18. One year after operation. In excellent condition one year after operation, when she "moved."

No. 19. One and six-twelfths years after operation. Much improved, has gained weight, and works on "half time."

No. 20. Only moderate improvement after two months.

No. 21. One and eleven-twelfths years after operation. In "splendid health," but insurance company refused him on account of pulse.

No. 22. Only moderate improvement six months after operation.

In studying the entire group of thyrotoxic cases we find that 46 patients have been followed long enough after operation to give an indication of the value of the procedure.

31 ($67\frac{4}{10}$ per cent) showed very great improvement.
13 ($28\frac{2}{10}$ per cent) showed moderate improvement.
2 ($4\frac{4}{10}$ per cent) showed no noteworthy improvement.

The latter two were seen respectively two and six months after operation—too short a time to make a just estimate of the final result. This large percentage of marked improvement is surely very encouraging. The patients were very ill, and I know of no other form of treatment which would have given them as good results.

The mortalities occurred mostly in the early cases. At the present time palliative measures would be used for longer periods before operating on patients who showed such extreme debility. Hot-water injections (Porter) and rest are the measures now most used in preparing these extreme cases for ligation of arteries or hemithyroidectomy.

Type of Operation

During the period covered by this report, hemithyroidectomy has been the operation of choice. The thyroid isthmus and a small portion of the remaining lobe have also been frequently removed, but there has been no indication that this is important. Ligation of the superior thyroid arteries has been done 16 times —always in the expectation of later hemithyroidectomy.

Six of these patients improved so much after this ligation that no further operation was done; the seventh had the inferior thyroid arteries ligated later at another hospital, and the result was good. In 5 instances ligation was followed by hemithyroidectomy. One patient could not be traced. As stated above, 3 of the fatalities occurred after or during ligation.

We may give good attention to Rogers's statement that 40 per cent of the cases are cured by ligation of 3 arteries—60 per cent by hemithyroidectomy, and 75 per cent by ligation of 4 arteries. The results in this series of cases surely give one an increased respect for the procedure of artery ligation.

It has been stated that by removing a lobe and the isthmus there is danger of taking away thyroid tissue which may be needed. In this series we found no evidence that any patient suffered from loss of thyroid tissue.

Group II. Patients in Whom Pressure or Deformity Were the Main Symptoms.—The group of so-called "simple goitres" presented problems which were of considerable interest, and, from a surgical view-point, were most satisfactory.

There were 59 in this group, only 8 of them males. 10 of the recorded ages were in the second decade of life; 14 were in the third; 19 were in the fourth; 7 were in the fifth; 1 in the sixth, and 1 in the seventh.

All suffered from the mechanical presence of the growths. In some instances the pressure on the trachea was sufficient to cause difficulty in breathing; in others there was a general sense of discomfort from the fulness in the neck.

The average noticed duration of the growth had been six and eight-tenths years.

It was not always possible to tell before operation whether there were nodules or cysts on the gland which could be enucleated, or whether it would be necessary to remove the lobe as far as its posterior capsule. The advantage of enucleation, however, was always appreciated, and 26 patients were treated by that method.

In 23 instances hemithyroidectomy was done; often a little of the mid-portion of the remaining lobe was also taken. In 10 instances a considerable portion of the remaining lobe was also taken.

There was no mortality from any of the operations in this group, and there were no serious complications. The average detention in the hospital after operation was eleven days.

The later history of 55 of these patients was obtained for periods varying from six months to nine and two-twelfths years. All of them had remained well so far as their necks were concerned, and none of them had developed symptoms of hypothyroidism.

The best cosmetic results were obtained in those patients from whose thyroid cysts were enucleated. The

thin transverse scars were hardly visible and otherwise the necks looked normal and seemed normal. There was no evidence of recurrence of the cysts. In 2 instances small nodules were noticed, but the patients said they had been present immediately after operation, and they were unwilling to have them removed.

Group III. Carcinoma and Allied Conditions.—There were 4 cases of carcinoma in whom satisfactory operations were impossible. Three of them died after various periods, and the post-operative history of the other could not be obtained. One patient with endotheliome was "well" four years after operation.

One case of papillary cyst adenoma with marked induration of the surrounding tissues made a tardy recovery after an incomplete operation, but was well two years later.

Pathological Studies

With the aid of Doctor Mortimer Warren, Doctor Baldwin Mann, and Doctor William C. Clarke, pathological studies have been made of the specimens removed, and further studies have been made to compare these specimens with the clinical histories of the patients. The studies of Wilson and Plummer have been taken as a guide, and the results have been confirmatory of their reports. The patients who have shown toxic symptoms have regularly had hyperplasia of the gland tissue. This hyperplasia has sometimes seemed almost uniform throughout the gland—sometimes it has been associated with colloid formation. The specimens which contain much colloid are the most difficult to interpret, and it has not always been possible to tell whether the

glandular elements in such specimens are in a condition of regression, or whether there is a certain degree of regeneration. It is our wish to continue the pathological studies and possibly to make a later report.

GALL-BLADDER DISEASE

A Brief Review of Two Hundred and Nine Cases Treated at The Roosevelt Hospital by the Surgical Staff during the Past Five Years

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During the past five years covered by this brief review, from 1910 to 1915, there were admitted to the surgical services of The Roosevelt Hospital 209 cases of gall-bladder disease, of which 188 were operated upon by the attending staff. Of those not operated upon, 13 were diagnosed as catarrhal cholecystitis, with no deaths, and one as suppurative cholecystitis with diffuse peritonitis and pneumonia, who died four hours after admission into the hospital.

Many of the cases were desperately ill at the time of admission into the hospital, and a large number of patients included in this report were subjected to operations upon other viscera than the gall-bladder and ducts, thus assuring a higher mortality than should be expected in operations upon the gall-bladder and its ducts alone.

Of the 209 patients, there were 138 females and 71 males, or 66 per cent females and 33.9 per cent males, showing the disease was present in a rather higher percentage of males than is usually attributed to them.

The age in the 137 patients in which it was recorded ranged from 19 to 78 years, or in periods of 10 years, as follows:

	Males	Females
Number of cases under 20 years of age	1	0
" " " between 20–30 years of age	8	20
" " " " 30–40 " " "	13	31
" " " " 40–50 " " "	10	24
" " " " 50–60 " " "	7	13
" " " " 60–70 " " "	5	4
" " " over 70 years of age	1	0

The gall-bladder was diseased most frequently in our series between the years of 30 and 40, and between the years of 30 and 50 there were 78 patients affected, while there were only 59 in the other periods of life.

The mortality in the patients operated upon, including the carcinomas of the gall-bladder and other viscera, was 11.9 per cent, or 10 per cent excluding the carcinomata—a mortality higher than can be justifiably explained other than by the desperate condition of many of the patients at the time of their entrance into the hospital, and by the prolonged stay in the hospital of some of the carcinomas of the gall-bladder, one dying on the fifty-ninth day and one on the sixty-eighth day. Ordinarily these cases would have been discharged about the twenty-first day and thus would not have been included in the hospital mortality.

No patient save one, who was moribund upon admission and died within four hours after her entrance into the hospital from suppurative cholecystitis, diffuse peritonitis, and pneumonia, was denied operation.

The different types of the disease are classified under the terminology that has been in use at the hospital for the past five years, *i. e.:*

Catarrhal cholecystitis,
Suppurative cholecystitis,
Gangrenous cholecystitis,

Cholelithiasis, calculus in the gall-bladder, cystic, common or hepatic ducts, and

Carcinoma of the gall-bladder.

Catarrhal Cholecystitis.—Of the 40 cases of catarrhal cholecystitis, 13 were not operated upon; and of these 13, 3 were discharged cured, 8 improved, 2 unimproved, with no deaths. Cholecystectomy was performed seven times with no mortality. Cholecystostomy was performed eighteen times with no deaths. Two cases were recorded improved, and 16 as cured upon discharge.

A. 3713. Discharged improved, was an obscure condition with a marked anæmia. This patient was transfused twice the sixth and seventh weeks after operation of cholecystostomy and appendicectomy.

Cholecystostomy with choledochotomy and cholecystectomy with choledochotomy were performed, once each, for catarrhal cholecystitis, with no mortality.

Suppurative Cholecystitis.—There were 28 patients of this group, all of whom were operated upon save 1:

A. 3618. Who was almost pulseless upon admission, who had associated with the suppurative cholecystitis a right lobar pneumonia and diffuse peritonitis. Operation was delayed, hoping for some improvement in her condition. She, however, rapidly grew worse, and died four hours after her entrance into the hospital.

Cholecystectomy was done upon 19 patients, with 2 deaths; cholecystostomy upon 4 cases with 1 death; choledochotomy upon 2 cases; cholecystectomy with choledochotomy and cholecystostomy with choledochotomy once each with no mortality.

The causes of the 10.1 per cent mortality, in those patients upon whom cholecystectomy was done, are as follows:

A. 2052. Pneumonia, died the seventh day after operation.

A. 660. Pulmonary embolus, the twenty-second day after operation. The wound was healed; the patient was walking around expecting to leave the hospital in a few days.

Cholecystostomy was done upon 4 patients, 1 of whom died—a mortality of 25 per cent.

A. 2307. Suppurative cholecystitis and suppurative cholangitis. Entered the hospital with a temperature of 105°. Cholecystostomy was done a few hours later. The patient ran a septic course with chills, fever, and sweats, dying on the nineteenth day from the suppurative process.

Cholelithiasis.—There were 135 cases of stones in the gall-bladder with or without stones in the ducts. Seven of these left the hospital without operation. Of those operated upon, cholecystectomy was performed sixty-one times, with 8 deaths—a mortality of 13.1 per cent. Cholecystostomy was done upon 50 patients, with 5 deaths—a 10 per cent mortality. Cholecystectomy with choledochotomy was done upon 12 patients with 2 deaths—16.6 per cent mortality. Cholecystostomy with choledochotomy was done upon 5 patients with 2 deaths —the high mortality of 40 per cent.

Of the 8 deaths following cholecystectomy, 2 were from pneumonia; 2 from diffuse peritonitis, in 1 of which diffuse peritonitis was present at the time of operation, and death resulted from perforated gastric ulcer and peritonitis. Three died within thirty to forty-eight hours after operation with nausea, vomiting, and abdominal distension, steadily rising fever, a rapid change in blood picture, with an increase in the leucocytes and polynuclear cells.

B. 2526. Admitted into the hospital with a temperature of 102.6°, W. B. C. 33,000, poly. 95 per cent. Immediate operation: cholecystectomy and gastrorrhaphy for perforated gastric ulcer and diffuse peritonitis. Died sixty hours after operation from diffuse peritonitis.

B. 4049. Cholecystectomy, myomectomy, appendicectomy, and right salpino-oöphorectomy; died five days after operation from diffuse peritonitis.

B. 3332. Cholecystectomy, appendicectomy, and gastro-enterostomy for duodenal ulcer; died nineteen days after operation from pneumonia.

B. 4336. Died of pneumonia four days after a cholecystectomy and appendicectomy.

A. 2175. Temperature remained about 100° for twenty hours after operation, then suddenly rose to 106°, and the patient died thirty-two hours after operation.

A. 4828. Temperature and blood count were normal on the day of operation; the day after operation temperature rose to 104°. Nausea, vomiting, and abdominal distension were present. The second day the condition was worse, and temperature rose to 106.2°, W. B. C. 26,000, poly. 87 per cent. The patient died forty-eight hours after operation.

A. 3756. Cholecystectomy with enterorrhaphy for fistula between the gall-bladder and duodenum. Slightly elevated temperature at the time of entrance into the hospital, also a moderate increase in leucocytes and polynuclear cells. Temperature steadily rose after operation; nausea, vomiting, and abdominal distension. Died thirty-three hours after operation.

B. 2125. Died the twelfth day after operation from lobar pneumonia.

Of the 5 deaths following cholecystostomy, 2 were from hemorrhage, 1 from pulmonary embolus, and 1 from gastric dilatation.

B. 1756. After an uninterrupted convalescence, during the last week of which the temperature remained normal, the patient was seized with acute abdominal pain on the twelfth day; went into collapse and died within one hour of the onset of the attack. Unfortunately no autopsy was obtained, and the exact cause of death remains obscure.

B. 2331. Died from a pulmonary embolus on the eighth day after operation.

B. 1111. Cholecystostomy and horizontal overlapping of the recti muscles for a large median ventral hernia. Died forty-eight hours after operation from gastric dilatation.

B. 2782. Hemorrhage was controlled with difficulty during the operation. Five hours after operation the patient suddenly grew worse with symptoms of hemorrhage. The wound was reopened and tamponed. Died one-half hour after the second operation.

B. 4820. This patient had a very large spleen; the abdominal wall bled profusely, also the gastro-colic omentum. The bleeding was controlled with difficulty. Patient died four and one-half hours after operation from hemorrhage.

Two patients died following cholecystectomy with choledochotomy.

A. 1431. Pneumonia, on the seventeenth day after operation.

A. 2802. There was a rapid rise of temperature immediately after the operation; nausea, vomiting and abdominal distension. Died forty-eight hours after operation.

Two patients died following cholecystostomy with choledochotomy.

B. 922. A second choledochotomy was done two months after the primary cholecystostomy with choledochotomy, removing stones from the hepatic duct. Died twenty-two days after the second operation. Autopsy disclosed pancreatitis, subphrenic abscess and tuberculosis of the peritoneum.

B. 1293. Subphrenic abscess which was operated upon on the twenty-ninth day after the primary operation. Death two days later.

Gangrene of the Gall-Bladder.—There were 3 cases of gangrene of the gall-bladder, 1 of which was perforated with diffuse peritonitis at the time of admission into the hospital. Of the 2 cases upon which cholecystectomy was done both were cured.

A. 569. Cholecystostomy was performed upon the perforated gangrenous gall-bladder with diffuse peritonitis, the patient dying thirty hours after operation.

Carcinoma of the Gall-Bladder.—There were 6 cases of carcinoma of the gall-bladder, upon 5 of which exploratory celiotomies were done. Upon 1—B. 2370—cholecystectomy was performed. This patient was seen two years and eight months after operation, at which time examination revealed nodules in the liver. She had lost 15 pounds in weight, and was slowly growing worse. The carcinoma of the gall-bladder in this patient—B. 2370—as well as in A. 341, was associated with calculi in the gall-bladder.

That there may have been calculi in the other carcinomas of the gall-bladder is quite possible. They, however, were not detected upon palpation at operation, and the gall-bladder was not opened.

Three of the 6 carcinomas of the gall-bladder remained in the hospital until death, and 1 carcinoma of the common duct, upon whom cholecystostomy was done, also remained until the sixty-eighth day, the time of her death. Two were discharged unimproved and have not reported since leaving the hospital.

Case report of those who died:

B. 2825. Carcinoma of the gall-bladder, nodules in the liver, intestines adherent to the gall-bladder. Died fifty-ninth day after exploratory celiotomy.

B. 5290. Had myocarditis at the time of operation; was out of bed when suddenly seized with an attack of dizziness and faintness on the sixteenth day. Died within a few minutes of the onset of the attack.

A. 655. Cholecystostomy for carcinoma of the common duct. Died on the sixty-eighth day after operation.

A. 1994. Carcinoma of the gall-bladder with metastases in the liver. Died the twelfth day after exploratory celiotomy.

Upon the mortality in the carcinomas of the gall-bladder no comment is necessary. They are, except in a few instances, hopeless conditions when seen by the surgeon, and fewer exploratories would be done upon them were we able to know the extent of the involvement without opening the abdomen.

The mortality in the other cases in this series is high, and much higher than is usually published. It should be remembered, however, that this review contains every case admitted to the surgical divisions, and further, that several cases were permitted to remain in the hospital till death who might otherwise have been discharged and not included in the mortality. Every case, no matter how desperately ill, with the exception of A. 3618, moribund upon admission, was given the opportunity of an operation.

Pneumonia caused 5 deaths, on the fourth, seventh, twelfth, seventeenth, and nineteenth days respectively.

Pulmonary embolus caused 2 deaths, 1 on the eighth and 1 on the twenty-second day.

General peritonitis, which was present at the time of operation, caused 2 deaths; and 1 patient—B. 1756—after a normal convalescence, was seized on the twelfth day with acute abdominal pain and died within an hour. Just what was the cause of this death, and how it could have been avoided, we do not know.

There were 4 deaths in this series—A. 2175, A. 4828, A. 3756, A. 2802, which occurred within forty-eight hours after operation, for which there is little adequate explanation. Two of these, A. 2175 and A. 4828, were cases of calculi in the gall-bladder upon whom cholecystectomy was done and who died within thirty-three hours. The picture presented by these, as well as by A. 3756, in which there was a fistula between the gall-bladder and duodenum, and A. 2802, in which choledochotomy in addition to the cholecystectomy was done, was the usual one of gall-stones, with a practically normal temperature, normal blood and urine analyses. But a few hours after cholecystectomy the temperature began to rise, and continued to do so with little, if any remission, until death. Accompanying the rapid rise in temperature, there was increase in pulse rate and respiration, nausea, abdominal distension, and vomiting.

That peritonitis, pneumonia, or the so often misapplied term sepsis could account for a death in so short a span of time seems hardly possible; and yet in spite of the blood cultures and the few autopsies we have been fortunate enough to observe, we are still without an explanation of this rapid termination in patients apparently in excellent condition for surgical operations.

The lesions associated with catarrhal cholecystitis were:

11 Chronic appendicitis.
3 Pancreatitis.
2 Pneumonia.
1 Acute ileus.
1 Renal calculus.
1 Pernicious anæmia.

Associated with suppurative cholecystitis were:

22 Calculi in the gall-bladder and ducts.
2 Chronic appendicitis.
1 Carcinoma of the appendix.
1 Suppurative cholangitis.
1 Pancreatitis.
2 Pneumonia.

The lesions associated with cholelithiasis were:

22 Suppurative cholecystitis.
17 Calculi in the common and hepatic ducts.
17 Chronic appendicitis.
2 Acute appendicitis.
4 Pneumonia.
2 Pulmonary embolus.
2 Carcinoma of the gall-bladder.
2 Chronic pancreatitis.
2 Acute pancreatitis.
1 Cyst of the pancreas.
3 Ventral hernias.
2 Hemorrhage.
2 Duodenal ulcers.
1 Perforated gastric ulcer.
1 Fistula between the gall-bladder and duodenum.
1 Biliary fistula.

THE DIAGNOSIS OF BILIARY OBSTRUCTION BY CALCULUS

An Analysis of Thirty-Three Cases of Common Duct Stone Operated upon by the Surgical Staff of The Roosevelt Hospital, 1910 to 1915

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To the mind that thinks exclusively in percentages, and is content with the face value of statistics, the analysis of any case series stands for unadulterated profit. But to that uneasy intellect which strives always to see behind the veil this patient dissection and reconstruction of records is an unsatisfactory occupation, and its accomplishment is followed only by that degree of satisfaction which goes with manual labor done. There is so little that can be called truly constructive about it, so much that is purely critical, and the opportunity and the temptation to color the observations recorded are so strong that the performance may be likened to the art of a tight-rope walker, eternally balancing between truth and truth as he sees it.

Given a theory to support or a premise to establish, he is not only a very honest but a very able author who can so divorce his inclination from his judgment as to set down the recorded facts unaltered and draw from them conclusions tinctured by no shade of preference. Often, too, it is necessary to "interpret" findings, and here he embarks at once upon a parlous enterprise, and

one which may, unless he be very wise and very honest, bring him an undeserved measure of praise or blame.

Happily, in the collection and presentation of these few statistics, the author has labored under no one of these burdensome conditions. Not having been responsible for the conduct of any of the recorded cases, he has no personal skeletons to closet nor triumphs to acclaim, and, having attacked the analysis in a desire for increased knowledge, he is more anxious than any other could be to have that knowledge as near the truth as possible. And he has been able to avoid any necessity for "interpretation" by stating boldly the many instances of omissions from the records.

Moreover, there are some bits of information that are of interest, a few possibly of value, which have been painfully gleaned, like grains among a mass of worthless chaff; and these have repaid the writer at least.

The records are those of 32 patients suffering from stone in the common bile duct, cared for in The Roosevelt Hospital during the years 1910 to 1914 inclusive.

They are recorded as 33 cases, one having returned to the hospital for a second operation some months after recovery from the first. Upon these 32 patients 34 operations for choledochotomy were performed by members of the surgical staff, to whose courtesy I am indebted for permission to report them.

One of the secondary choledochotomies was done upon the case above mentioned and the other upon a patient who remained in the hospital during the interval between her operations. The latter is therefore recorded as a single case (or admission), while the former is put down as 2 distinct cases.

It should be noted also that, during the five-year period

spoken of, 40 cases recorded as "Cholelithiasis, Calculus in Common Bile Duct," were admitted to The Roosevelt Hospital. In all but 1 of these an examination of the history and physical findings justifies the recording of that diagnosis; but only 33 of them were actually proven by operation. Of the remaining 7, 2 refused operation (1 died and 1 left the hospital); 2 proved, on operation, to be calculi in the gall-bladder and cystic duct pressing upon the common bile duct; and 2 had calculi only in the gall-bladder. The remaining case was an acute suppurative cholecystitis with no calculi found in the common bile duct.

"On an average," writes Naunyn, "every tenth human being, and of elderly women perhaps every fourth, has gall-stones." And Moynihan says: "In probably nine persons out of ten who carry gall-stones the disease is never recognized."

Viewed in the light of these authoritative statements, it is interesting to find that, during the five-year period, 1910 to 1914 inclusive, there were discharged from The Roosevelt Hospital 21,025 patients, of whom 210 had a diagnosis of cholelithiasis.

That is, about 1 per cent of all cases treated during that time were *discovered* to have gall-stones; and, of those in which gall-stones were found, about 16 per cent had calculus obstruction of the common bile duct.

Analysis of History and Physical Examination

Age.—Among the cases proven by operation to be common bile duct calculus, the time of life appears to have a very definite bearing on the incidence of severe symptoms. Two-thirds of those whose ages were recorded were between 40 and 60 years old; 14 per cent

were between 30 and 40; and 11 per cent alike between 20 and 30 and 60 and 70 years of age; 20 years was the youngest, 70 years the oldest. In 5 cases the age was not recorded; 40 to 50 was the decade of election.

Moynihan gives the average age of his cholelithiasis patients as 45 years, while Hartman, whom he quotes, makes the average age still younger. Now, the average age of the obstruction cases was 47 years; men 43 years, women 48 years. This affords good, indirect evidence that gall-stones are liable to create disturbances that lead to their discovery long before they reach the common duct.

On the other hand, 2 cases in this series had their first pain synchronous with their first attack of jaundice.

Sex.—One is somewhat surprised to find that exactly two-thirds of the whole number of cases occurred in women.

Autopsy statistics (quoted by Moynihan) show the male to the female ratio in undifferentiated cholelithiasis as varying, with different observers, between 1 to 5 (Schröder) and 1 to 2½ (Röther); but our Roosevelt Hospital operation statistics agree much better with the latter, being approximately 1 to 2, just as in the common duct cases.

Typhoid.—It is disappointing to have to admit that 18 cases had no note as regards typhoid fever; but, in the 15 cases, where an answer to the question of previous typhoid was recorded, only 3 gave a positive history of it, while B. typhosus was noted in culture from one with a negative history. This fairly confirms the statistics of Chauffard, who found 20 per cent, and Cushing, who found 30 per cent of typhoid histories in gall-stone cases.

Duration of Symptoms.—Little enlightenment comes from an examination into the length of time that symp-

toms had been noticed by the patient, except the fact that the large majority of cases had had ample warning of trouble in the right upper quadrant. Out of the 29 cases in which this historical detail was noted only 1 recalled no previous attacks. Three had suffered for an indefinite period, 6 for less than one year, while 15 had been ailing with the same complaint for from two to eight years, an *average* (if one may so describe it) of nearly six years. Five cases had very long-standing complaints, 1 for ten, 1 for twelve, 1 for eighteen, 1 for twenty, and 1 for thirty years. These periods, of course, include the symptoms of undifferentiated cholelithiasis. One finds it difficult, in examining the records, to discriminate between symptoms due to cystic-duct occlusion and common bile-duct occlusion, and therefore one cannot at all definitely establish any point of time at which common bile-duct obstructive symptoms supervened upon those of cystic-duct occlusion, because so few cases have any record of the date of the first attack of jaundice.

But by taking the 10 patients in whom the date of the first attack of pain without jaundice, as well as the date of the first appearance of jaundice, were noted, one finds that the shortest interval (between the first sign of undifferentiated cholelithiasis and the first sign of biliary obstruction) was two months and the longest eight years, while the average interval was about three and one-half years. (Besides these there were 2 cases, at least, in whom the first attack of pain was synchronous with the appearance of jaundice.) In other words, while the question, "How long after an initial attack of gall-stone pain may you reasonably expect a common bile-duct obstruction, and in how many cases?" cannot be definitely answered, one might, perhaps, infer from these instances that

16 per cent of all cholelithiasis cases would develop biliary obstruction, and that this condition might be expected to supervene within four years from the first sign of the presence of gall-stones.

Duration of Present Attack.—Among the 28 cases where this datum was recorded, symptoms leading to their admission to the hospital had been practically uninterrupted in 9 cases for less than a week; in 8 cases for periods between one and four weeks; in 8 cases between one and eight months. One case had suffered, practically continually, for ten months, and 2 were admitted in the interval between attacks, with practically no symptoms present. From this it appears that at least 50 per cent of the cases had suffered *continuously* for less than two weeks before their admission; about 34 per cent for more than a month.

Previous Operation.—The fact that nearly one-half of the cases from which such data were obtained had submitted to a previous operation upon the bile passages is very suggestive. For, says Moynihan, "It is desirable we should know of the frequency of recurrence of gall-stones (and this should be distinguished from the spurious recurrence which is the sequel of incomplete removal of stones), and of the symptoms that ensue when adhesions have formed to a chronically inflamed gall-bladder, even after all stones have been removed." The question was not recorded in 7 cases, but 13 were noted as having had no previous operation, while 13 had been subjected to one or more. Of the 13, 4 were cholecystostomies, 5 cholecystectomies, 1 cholecystostomy followed later by cholecystectomy, and 2 were cholecystostomies followed by choledochotomy. One was cholecystostomy followed by partial cholecystectomy. Briefly,

then, of the 25 patients with calculus in the common bile duct, 6 had previously had their gall-bladder drained and 6 had had it removed. One had first undergone drainage, then partial removal; 3, among these, had previously had calculi removed also from their common ducts.

This adds little to the argument of those who contend that the removal of the gall-bladder renders recurrence of cholelithiasis less likely.

Temperature on Admission.—Moynihan says: "The temperature angle in an attack is of the characteristic 'steeple' form. There is a rapid rise and a rapid fall to the normal in each attack." Courvoisier, in his famous analysis, found fever in 25 per cent of the recorded cases of occlusion by stone. Moynihan considers this too low an estimate. "If," he says, "a case of common duct obstruction be observed for a period of two or three weeks, there will, with few exceptions, be found some abrupt elevation of temperature coinciding with the pain."

Now, one striking observation in these patients was the comparatively slight febrile reaction. Nearly four-fifths of the whole series had an admission temperature of less than 101° F. The other 7 varied between 101° and 105° F., 1 having less than 102° F., 2 between that and 103° F., 2 between 103° and 104° F., 1 between 104° and 105° F., and 1 between 105° and 108° F.

It is fortunately not the custom, in this time and locality, to observe such cases as these for a period of two or three weeks (as Moynihan suggests) without offering surgical interference. Otherwise we might be able better to support his views in this regard.

All these 7 were very sick people. But so were some

of the others. Two patients, for example, with temperature under 100° F., had a white-cell count of 19,000, 82 per cent polynuclears, and 23,000, 86 per cent polynuclears, respectively, while the highest temperature of the series had a white-cell count of only 7,000, 89 per cent polynuclears. For the most part, however, the degree of temperature and height of white-cell count harmonized in the expected fashion.

Situation of Pain.—Moynihan says that pain elicited by the presence of gall-stones is either "local" or "referred," the local pain being either dull and aching or acute and almost intolerable.

In the majority of cases, of course, the pain was said to be situated in the right upper quadrant. But a more original one-quarter of the patients located it in the epigastrium; while one independent person indicated it behind the umbilicus, another in the back to the right side, a third complained of the upper half, and a fourth suffered all over his belly. Two, strangely enough, affirmed that they had had practically no pain whatever.

Character of Pain.—"Pain," says Moynihan, "is present only at times. It comes, as a rule, in attacks which vary much in severity." Two patients said that their pain was really only a sort of "soreness"; 3 admitted that it was "slight." One characterized it as a "heavy, dull ache," but 8 called it "steady, severe, and sharp." Five called it "sharp and knife-like," 5 said it was "colicky, like cramps," and one complained of "unbearable griping." Whether the colicky pains are due, as Moynihan plausibly claims, solely to passage of the stone (or its attempted passage), or, as Riedel supposed, to inflammatory processes and adhesions in and around the gall-bladder or the ducts, is a matter of

theory, but it is a matter of history that 19 of the patients had really severe pain in attacks and 11 of them described it as "colicky."

Duration of Pain.—The duration of any attack of pain is always a difficult point to establish, and it is not surprising that 15 cases had no note in regard to it. Seven (nearly one-half) of the others, however, said that each attack lasted several hours; 2 made the period two days, and 3 averred that their sufferings were constant, except while under morphine, for three or four days; 3 gave the length as from one to three weeks. One said the length of the attacks varied considerably, and 1 had pain only for a short time, coming on an hour or so after meals, like a duodenal ulcer.

Radiation of Pain.—Rather surprising variations in the radiation of the pain were observed in 18 cases, and there were no less than eleven different combinations of right and left shoulder, interscapular region, hypochondrium and right and left sides, a monument to the conjoined ingenuity of the patient and the recorder; but it is enough to say that pain radiated to the back in 10 cases, to an undifferentiated shoulder in 6, to the right shoulder in 5, to the left shoulder in 1, and that the right side was complained of by 3 and the left side by an equal number of patients. One said the pain was absolutely local. Only 4 of the 6 previously cholecystectomized patients had the character, duration, radiation, and location of their pain noted, and it is disappointing to admit that no characteristic difference can be stated between their pain and that of the rest of the series; but it is interesting to find that they all located it in the epigastrium rather than in the right hypochondrium.

Previous Indigestion, Vomiting, Constipation.—"If one wished to frame an epigram it could be said, with truth, that the most common symptom of gall-stones is indigestion," says Moynihan.

Three-quarters of the recorded cases in this series recalled previous indigestion, vomiting during the attacks, and constipation. One among the others, oddly enough, complained of diarrhœa. But this patient was suffering from well-marked pancreatitis and tuberculous peritonitis as well.

Light-Colored Stools.—Almost 90 per cent of those in whom this detail was recorded had noticed that their stools were light-colored, but there were 3 out of the 20 who said their stools were normal in color.

Dark-Colored Urine.—Less than half the series, on the other hand, had observed any darkening of the urine, but this notation was omitted in 20 cases, and we should, perhaps, find a higher percentage if all the answers had been recorded. Still Moynihan says: "After an attack there is obvious evidence, both in the fecces and in the urine, that less bile is getting access to the duodenum. The variations are, however, much more readily recognized in the stools than in the urine."

Jaundice, Previous.—Apparently about 20 per cent of the recorded cases had never suffered obstruction of the common bile duct previous to their admission to the hospital, for there were 6 patients who could recall no previous jaundice, 17 *had* noticed it, and in so many as 10 the detail was omitted.

Jaundice, Present.—Although there were 4 instances in which the historian had neglected to record the presence or absence of icterus, of the remaining 29 jaundice

was present in 28 at the time of admission, proving it a very reliable symptom.

Kehr has said that jaundice was absent in one-third of his cases of stone in the common duct, but Moynihan declares that in over 100 consecutive operations for gall-stones he has only found stones in the common duct twice without symptoms, and Courvoisier called jaundice the "cardinal symptom" of common duct obstruction.

Loss of Flesh.—There were no cases of malignancy in this series, but the decrease in weight was astonishing, almost unbelievable, in 7 cases, 1 of whom had lost fifteen, 1 eighteen, 2 twenty apiece, 1 thirty-one, 1 forty, and 1 forty-six pounds within the year. Moynihan calls attention to the importance of recognizing this as a frequent and striking manifestation of stone in the common duct. Four others stated an indefinite loss of weight. Five had lost appreciably, and half the histories had no record of this datum.

Loss of Strength.—Marked loss of strength was noted in one-fifth of the series. Indeed, the chief complaint of 2 patients was weakness and jaundice, but most of them had either not lost strength or else failed to record it.

Abdominal Rigidity.—In such a serious intra-abdominal lesion as common bile-duct occlusion by calculus, one would naturally expect marked indication of it in a reflex spasm of the abdominal muscles. But, although the results of the examination were noted in 24 cases, only about half of them had abdominal rigidity. In 7 it was marked and in 6 it was only slight.

Abdominal Tenderness.—Tenderness, however, was frequently present, and in 27 cases noted it was marked in 12, slight in 13, and absent in only 2.

Point of Greatest Tenderness.—But the point of greatest tenderness is, as usual, a difficult one to fix. Over gall-bladder region, 6; right upper quadrant, 3; epigastrium, 3; deep under right costal margin, 3 embraced the majority. Two cases, however, located it in the middle line, one and a half to three inches above the umbilicus, and one in the right flank over the eleventh rib. In reading these varied locations, one cannot help suspecting that this point of greatest tenderness depends somewhat upon the weakness of the patient and the power of the interne's thumb.

Dulness or Mass in Gall-Bladder Region.—A palpable mass was noted in 2 patients in the gall-bladder region, and in one other dulness to percussion outlined the viscus. One count in the chief complaint of a fourth was "swelling in right upper quadrant," yet the gall-bladder could not be definitely located. The general correctness of Courvoisier's law was reaffirmed by the fact that 13 cases (76 per cent) exhibited neither dulness nor mass in the gall-bladder region, and this observation was well supported later by the pathological findings at operation. In half the series this point was not recorded.

Enlargement of Liver and Spleen.—It might well be expected that enlargement of the liver would follow the obstruction of its excretory duct fairly promptly; but of the 15 cases in which the liver was mapped out, 8 showed, at the time of examination, no alteration from the normal size; 7, on the contrary, showed definite enlargements of from a finger's breadth to as much as four inches below the costal margin, and in only 1 case the spleen was markedly enlarged, although Moynihan says: "In many cases an enlargement of the spleen is noticed,

more especially after an attack and for some days subsequently."

Chills and Fever.—Twenty-two out of 26 cases gave a distinct history of, or presented in the hospital before operation, chills with rise of temperature, a very certain indication, if we are to agree with Moynihan, that cholangitis existed at the time of their admission or had existed prior to it. This was an event rather to be expected, inasmuch as about three-quarters (74 per cent) of the recorded cases had suffered for a considerable period from obstructive symptoms.

Blood Examination.—The white blood-cell count, which was recorded in all but 5 cases, varied within such wide limits that no definite average or characteristic for this reaction can be stated. This much may be said, however, that the majority were relatively low, 17 of the 28 being under 13,000 with a differential of 80 per cent or over in only 5. The other 11 ran from 13,000 to 35,000, and had generally a high polynuclear count (above 80 per cent in all but 2).

Bile in Stools.—The laboratory reported bile present in the stools in 77 per cent of the 9 cases examined.

Bile in Urine.—The urine contained bile in 76 per cent of the 21 cases recorded.

Blood-Coagulation Time.—Much has been said of, and frequent are the warnings against, possible hemorrhage in jaundiced patients; yet, although 28 of these patients were jaundiced, only 10 had their coagulation time investigated and marked retardation was observed only in 4, the blood of one requiring six, of another seven, of another eight, and of the last fourteen minutes to coagulate. This was the only 1 of the 4 to receive serum before operation. Coagulation time in the remaining 6

cases (3 of whom later received serum) varied between three and one-quarter and four and three-quarter minutes; and it is interesting to know that there was no serious hemorrhage in any of the patients either at or after operation.

Chief Complaint.—A composite of the chief complaints these patients made, as a series, outlines fairly well, on the whole, the most prominent symptoms of calculus in the common bile duct. (1) Pain, (2) jaundice, (3) chills and fever, (4) constipation, with light-colored stools, (5) weakness, and (6) drowsiness in eight different combinations and permutations were the crucial factors that most engaged the patients' attention at the time of their admission to the hospital; and we shall see in our résumé that most of these are the really striking symptoms of biliary obstruction by calculi.

Diagnosis.—For, after the long hours' searching through the ill-written histories, after the most painstaking analysis of the stated facts, after the tedious recording and classification of the accumulated data, one inevitably arrives at this conclusion, that diagnosis of biliary obstruction by calculus rests almost entirely upon the history and the patient's complexion.

(1) *Jaundice*, observed in 28 out of 29 cases.

(2) *Pain*, complained of in 31 out of 33 cases.

(3) *Constipation, with light-colored stools*, in 17 out of 20 cases.

(4) *Chills and fever*, complained of in 22 out of 26 cases.

(5) *Tenderness*, in 25 out of 27 cases.

These made the diagnosis in this series. The vomiting, the loss of weight, the blood count, the evidence of previous typhoid or operation, or the examination of the stools and urine offered confirmation in some

cases, of course. But, by the numerous omissions of these data from the records, one must believe that it was *only* confirmation, and that the operating-room would have been prepared in every instance without these additional incentives. For, as Moynihan says, "In many cases, certainly in the majority, the diagnosis of stone in the duct (*i. e.*, common bile duct) is correctly made with the most positive assurance."

Difficulties of Diagnosis.—But there were a few among these that offered certain diagnostic difficulties. One case, for example, that gave no history of previous typhoid or operation was not jaundiced at the time of admission and never had been; nor were the stools light-colored nor had darkening of the urine been observed; nor was any pain present for eighteen hours previous to admission. But a typical colicky attack of pain, which radiated to the epigastrium, back, and right shoulder a week before, was stated, lasting for forty-eight hours and repeated a day or two later for twelve hours. There was tenderness in the right upper quadrant, and the temperature was 104° F. and white blood count 10,000.

Here, then, was ample evidence of a surgical condition of the bile passages, but a diagnosis of calculus in the common bile duct under the circumstances suggests either clairvoyance or afterthought. Yet two large calculi were found, at operation, in the common duct, together with one calculus, and much fine gravel in the hepatics; and, most interesting of all, the gall-bladder, which was small, thick-walled, with an abscess cavity containing 5 ounces of pus to its mesial side and a small lumen with many trabeculæ across it, contained no calculi.

Another case, a woman of 62 years, with normal pulse, temperature, and blood count, with a three-year history of gall-stone pain and a 20 pound loss of weight, had never been jaundiced till five days before her admission. She had a firm, smooth, globular mass 3½ inches in diameter, elastic and tender to pressure, and movable in all directions, palpable in the mid-clavicular line just below the liver, which itself was somewhat enlarged.

Here the age, the loss of weight, the presence of a presumably distended gall-bladder, and the absence of all acute symptoms except pain, might well have made one seriously inclined toward a diagnosis of biliary obstruction by neoplasm or chronic pancreatitis. But the operator was, perhaps, decided by a vague history of chills and fever. At any rate, a diagnosis of stone in the common duct was recorded and, at operation, the common duct was found "packed full of good-sized, soft stones throughout," and the hepatic ducts, too, held many calculi, while the gall-bladder was greatly distended but contained no stones.

The difficulties of differential diagnosis are, however, most practically illustrated by the fact, already mentioned, that there were, during the five-year period, 5 cases, not included in this series, all of whom were operated under a diagnosis of stone in the common bile duct. The mistakes amounted to 13 per cent of the diagnoses, and were proven by operation, which served also to show that common duct calculus cannot always, even by jaundice, pain, chills and fever, be differentiated from calculus in the cystic duct, acute suppurative cholecystitis, and cholecystic calculi with chronic pancreatitis.

POST-OPERATIVE SEQUELÆ IN ONE THOUSAND SEVEN HUNDRED AND FORTY-EIGHT CASES OF APPENDICITIS

Operated by Members of the Surgical Staff of The Roosevelt Hospital from 1910 to 1915

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Of 1,748 patients operated upon at The Roosevelt Hospital in the past five years for appendicitis, 124, or about 7 per cent, had sequelæ. From this number are excluded patients operated upon elsewhere but presenting themselves at The Roosevelt Hospital for the treatment of sequelæ. Nor are patients considered who have developed complications before submitting to operation. The operations were done for disease of the appendix. Thirty-nine cases are not included in these figures, for associated conditions seemed more important than those found in the appendices.

TABLE I

GIVES THE NUMBERS OF THE DIFFERENT VARIETIES OF APPENDICITIS

	Cases	Deaths	Per cent
Acute appendicitis	545	10	1.8
Acute appendicitis with peritoneal abscess	258	12	4.5
Acute appendicitis with acute local peritonitis	110	3	2.7
Acute appendicitis with acute diffuse peritonitis	43	16	37.2
Acute appendicitis with progressive fibrino-purulent peritonitis	9	5	55.5
Chronic appendicitis	783	4	0.5
Total	1748	50	

TABLE II

GIVES THE NUMBERS OF THE MORE FREQUENT SEQUELÆ, WITH FATALITIES

	Cases	Deaths	Per cent
1 Subsequent peritoneal abscess	24	3	12.5
2 Infected operative wound	22	1	4.5
3 Pneumonia	18	7	38.8
4 Fecal fistula	13	2	15.3
5 Acute ileus	13	8	61.5
6 Thrombophlebitis	10	1	10.0
7 Ventral hernia	9	0	0.0
8 Sero-fibrinous pleurisy	8	1	12.5
9 Suppurative pleurisy	4	2	50.0
10 Embolism	6	2	33.3
11 Persisting sinus	5	0	0.0
Total	132	27	20.4

Subsequent Peritoneal Abscess.—Twenty-four cases with 3 deaths. Mortality 12.5 per cent. This was the most frequent sequela. Twenty-three patients were operated upon once for a subsequent abscess, while 1 was operated upon twice, first for a pelvic and then for a subphrenic abscess. The operation for the abscess came on an average of fourteen days after the appendicectomy. The abscesses were 10 pelvic, 6 subphrenic, 4 right iliac, 3 hypogastric, and 2 left iliac. Of the 6 subphrenic abscesses 4 had other complications, *i. e.*, 1 had an endometritis, 1 a sero-fibrinous pleurisy, 1 a suppurative pleurisy, and 1 a liver and lung abscess. This latter was the only fatality among the subphrenic abscesses.

Infected Operative Wound.—Twenty-two cases with 1 death. Mortality 4.5 per cent. Infection occurred 10 times in acute cases and 12 times in chronic. Where cultures were taken of the discharge, the colon

bacillus was invariably grown. This suggests that the fault might more often be found in the handling of the appendix than in the sterilization of skin and suture material.

Infection of the wound doubled the length of stay in the hospital, *i. e.*, increased it to twenty-five days. The 1 fatality of this series was due to pneumonia.

Pneumonia.—Eighteen cases with 7 deaths. Mortality 38.8 per cent. Under this head both lobar and broncho-pneumonia are grouped. Twelve cases occurred in acute appendicitis and 6 in chronic. Of the 7 deaths, 6 were among the former, and 1 among the latter. In the acutely septic cases, pneumonia proved a very dangerous complication. The right side of the chest was usually affected—11 to 1 in the histories mentioning the side involved. The signs developed on the second or third day.

Fecal Fistula.—Thirteen cases with 2 deaths. Mortality 15.3 per cent. Of the 13 fistulæ, 8 closed spontaneously, 2 were operated upon successfully, and 1 failed to close after two operations—64 per cent spontaneous cures. The spontaneous cures averaged five weeks in the hospital. Twelve cases occurred in acute appendicitis with drainage, 1 in a chronic appendicitis, on whose history it was stated that there had been considerable difficulty with inversion of the appendix stump. The appendix stump was inverted 7 times, ligated 3 times, and in the remaining 3 the appendix was not removed. Two fistulæ developed after draining a secondary abscess, 1 cecal and 1 hypogastric.

Of the 2 fatal cases, 1 was a pregnant woman who

aborted and died of pneumonia, while a restricted autopsy did not reveal the cause of death in the other.

Acute Ileus (Intestinal Obstruction).—Thirteen cases with 8 deaths. Mortality 61.5 per cent. Ileus occurred only after drainage. Of the 13 cases, 11 were operated upon, 1 revealed obstruction at autopsy, and 1 was cured by enemata. The obstruction, in the 12 opened cases, always in the small gut, was due either to constricting bands, to angulation of the gut produced by adhesion of loops, or, as seemed probable in a couple of cases, to the drain. In 8 the obstruction was close to the ileo-cecal valve; in 1, three feet from it; while in 3 the distance was not mentioned. The operative procedure in 6 cases was division of the constricting band, or separation of adhesions; in 2, enterostomy; in 2, enterorraphy for rupture during separation of adhesions; and in 1, aspiration of the bowel to diminish the distention. All of the 8 fatal cases were operated upon for ileus within twenty-one days of the original drainage, whereas the recoveries were operated on the fifth day, twenty-eighth day, at the end of six months, and at the end of a year.

Thrombophlebitis.—Ten cases with 1 death. Mortality 10 per cent. This sequela occurred 6 times in chronic appendicitis and 4 times in acute. It was unilateral 7 times, bilateral 3. The average length of stay in the hospital was thirty days. One case had right and left pulmonary emboli.

The one fatality was due to pneumonia. This case has been mentioned under three headings: Infected Operative Wound, Pneumonia, and Thrombophlebitis.

Ventral Hernia.—Nine cases. No mortality. Eight hernias appeared after drainage cases, 1 after an infected wound. The average time post-operative before the beginning of evidence of a hernia was four months.

Sero-Fibrinous Pleurisy.—Eight cases with 1 death. Mortality 12.5 per cent. There were 5 serous and 3 fibrinous pleurisies. Disease on the right side of the chest predominated.

The 1 fatality of this group was due to peritoneal and liver abscesses.

Suppurative Pleurisy.—Four cases with 2 deaths. Mortality 50 per cent. One fatal case was complicated by subphrenic, liver, and lung abscesses; the other by diffuse peritonitis.

Embolism.—Six cases with 2 deaths. Mortality 33 per cent. The diagnosis in 4 cases, recovering, was made by the sudden onset of pain in the chest and dyspnea. Further evidence in 2 cases was the occurrence of phlebitis and bloody sputum.

The earliest embolism occurred on the fifth day, the latest on the sixteenth, the average being on the tenth day. One patient had two attacks, another three. The right chest was affected in the proportion of 5 to 2.

The 2 fatal cases were doing well, when suddenly they died, the symptoms in one not being stated, in the other being abdominal pain.

Persisting Sinus.—Five cases. No mortality. These were the result of draining appendical abscesses without removal of the appendix. Four healed nicely after

excising the tract and amputating the remains of the appendix, while the fifth required three operations to close, a fecal fistula occurring after the second.

TABLE III

GIVES THE LESS FREQUENT SEQUELÆ, WITH NUMBER OF FATALITIES

	Cases	Deaths
1 Acute diffuse peritonitis	3	3
2 Abortion	3	1
3 Septicemia	3	2
4 Liver abscess	2	2
5 Acute colitis	2	0
6 Parotitis	1	0
7 Auricular fibrillation	1	0
8 Hemorrhage from wound	1	1
9 Exacerbation of chronic nephritis	2	0
10 Suppurative nephritis	1	0
11 Pyonephrosis	1	0
12 Pyelitis	1	0
13 Perinephritic abscess	1	0
14 Hematuria	1	0
Total	23	9

The mortality for the entire series of 1,748 cases is 2.8 per cent; for the cases with sequelæ, 23.3 per cent.

The deaths in Tables II and III total 36 for 29 patients, as 2 were reported three times each, and 3 were reported twice each.

COLLES' FRACTURE

Treatment and Results at The Roosevelt Hospital

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In order to give a general idea of the fracture work which has been done in the Out-Patient Department during the last five years, the following general statistics have been prepared. There were in all 2,521 cases of fracture, not including fractures of the ribs or nasal bones, no record of these having been kept, and not including cases that were immediately referred elsewhere for treatment.

TABLE I

	Cases
Clavicle:	
Outer inch	12
Elsewhere	203
Scapula	10
Humerus:	
Tuberosities	20
Surgical neck	47
Upper epiphysis	4
Shaft	38
Supracondyloid	67
External condyle	46
Epiphyseal separation of external condyle	9

	Cases
Internal condyle	13
Internal epicondyle	20
Epiphyseal separation of internal epicondyle	13
Radius and Ulna:	
Olecranon	32
Head or neck of radius	41
Shaft of radius alone	138
Shaft of ulna alone	62
Both bones (shafts)	236
Wrist:	
Colles' fracture	444
Chauffeur's fracture	130
Other fractures of radius	87
Separation of epiphysis	122
Carpal bones	40
Hand:	
Metacarpal* bones	253
Phalanges	106
Thigh and Leg:	
Femur	6
Patella	2
Tibia	47
Fibula (not ankle cases)	6
Both bones	17
Ankle	108
Foot:	
Tarsal bones	16
Metatarsal bones	75
Phalanges	37
Rare Cases not Included in the Above:	
Zygoma	1
Transverse process of vertebra	1

* Multiple fractures of phalanges, metacarpals, or metatarsals are counted as one fracture.

	Cases
T fracture of elbow	2
Spine of tibia	1
Coronoid process of ulna	3
Styloid of ulna alone	6

As is shown above, there have been 444 cases of Colles' fracture treated in the last five years, 130 cases of chauffeur's fracture, 122 cases of epiphyseal separation at the lower end of the radius (including those cases in which a small chip is torn off the diaphysis), and 87 other cases of fracture of the lower end of the radius, as styloid process of radius, anterior or posterior lip, fissure, etc.

For the purpose of statistical analysis 200 consecutive cases of Colles' fracture are taken, representing a period of about twenty-eight months.

Ninety-four were of males, 104 of females.

Their ages were, according to decades, as follows:

TABLE II

	Decades								
	2d	3d	4th	5th	6th	7th	8th	9th	Not given
Males	3	18	26	24	10	3	1	1	8
Females	1	9	20	33	26	11	3	0	3
Totals	4	27	46	57	36	14	4	1	11

TABLE III

	Cases
In the great majority of cases the injury was caused by slipping, or tripping, and falling on floor or sidewalk, etc	116
Falling from ladder	4

	Cases
Falling down-stairs	24
Falling while skating	6
Falling a distance of 5 feet, or less	26
Falling more than 5 feet	5
Direct violence	6
Being knocked down	3
Warding off pressure	3
Hand twisted	2
Cause not given	5

During this same period there were 58 cases of chauffeur's fracture. The ages of the patients, all men, were, by decades: second decade, 1; third, 29; fourth, 20; fifth, 4; age not given, 4.

The cause of this injury is, of course, the kicking back of the automobile engine while it is being cranked in starting. In 12 cases the back kick occurred while the handle was being pressed down (indirect violence); in 5 cases it occurred while the handle was being pulled up, the handle flying around and striking the man on the back of the wrist. In this connection it must be remembered, however, that when spinning the engine it is very difficult to tell exactly when the back kick occurs, and the sudden feeling of pain at the site of fracture might lead one to think that he had been struck there. In 41 cases there were no details given.

During this same period there were 62 cases of separation of the lower radial epiphysis, of which 58 were boys and only 4 girls. This is a great disproportion, and the only plausible explanation of it lies in the different forms of play in the two sexes at this age. We have already seen that there are twice as many cases of Colles' fracture in men as there are in women during the third decade,

and that it is only from the fifth decade on that the percentage of women increases over that of men.

The ages at which these epiphyseal separations took place are as follows:

TABLE IV

	Ages—Years															
	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Cases.	1	1	2	1	1	1	9	7	9	5	10	5	4	4	1	1

Of the other fractures of the lower end of the radius which were treated during this same period, fractures, that is, which were not true Colles', were not epiphyseal separations, and were not caused by the kick of an automobile, 26 were in men and 11 in women.

Their ages were as follows:

TABLE V

	Decades						
	2d	3d	4th	5th	6th	7th	Not given
Males	0	6	7	9	0	1	3
Females	2	0	3	5	1	0	0
Totals	2	6	10	14	1	1	3

Here the men largely outnumber the women. It is difficult to say why, as the causes of these fractures are practically identical with those of Colles' fracture.

The symptoms of these four types were:

TABLE VI

	Colles' per cent	Chauffeur's per cent	Epiphyseal per cent	Other fractures, per cent
Swelling:				
Present	62	62	47	65
Absent	2	3	10	0
Not recorded	36	35	43	35
Ecchymosis:				
Present	35	30	11	24
Absent	18	16	25	41
Not recorded	47	54	64	35
Disturbance of bony prominences:				
Present	13	2	0	0
Absent	10	21	20	32
Not recorded	67	77	80	68
Deformity:				
Present	54	28	44	8
Absent	23	43	27	68
Not recorded	23	29	29	24
Direct tenderness:				
Present	89	90	90	89
Absent	0	0	0	0
Not recorded	11	10	10	11
Indirect tenderness:				
Present	66	66	61	62
Absent	8	7	6	11
Not recorded	26	27	33	27
False point of motion:				
Present	39	43	29	3
Absent	37	40	58	76
Not recorded	24	17	13	21
Crepitus:				
Present	33	34	5	6
Absent	42	47	73	70
Not recorded	25	19	22	24

In analyzing the above table, you see at once that the most constant symptom, and therefore the symptom most

to be relied upon, is direct tenderness. By direct tenderness in fractures of the lower end of the radius we do not mean simply the presence of tenderness on pressure over the injured part. Such a symptom is, of course, present in any kind of recent traumatic fracture and in cases of simple contusion and sprain as well. What we do mean is that there is a *line* of tenderness stretching from the ulnar side of the radius, posteriorly, *without interruption* across the back of the radius, across its lateral aspect, and then across the front to its ulnar side anteriorly. This line may appear very broad in places, corresponding to injuries to the soft parts or comminution of the bone, but it is never interrupted. A convenient way to test the presence of this line of tenderness is to press with the blunt end of a pencil along a vertical line crossing the site of the suspected fracture, marking or noting the point or points of real tenderness. This procedure is repeated along a series of vertical lines, around three sides of the radius, and the points, or areas, of tenderness are then noted in their relation to one another.

Of course, in a few of the rarer forms of fracture (such as those of the anterior and posterior lips or incomplete or fissure fractures) this line of tenderness will not give such reliable information; but in the usual fractures it is almost infallible.

Swelling is an almost constant symptom, but it does not differentiate between a fracture and a sprain or contusion.

Indirect tenderness also is of little value on account of the proximity of the wrist joint and the fact that this joint is nearly always sprained or contused.

The disturbance in the relations of the bony prominences, in this case the relative raising of the radial styloid, gives little help in the diagnosis. Its presence is less frequent than that of deformity, and in only two cases in the entire series was it marked present in the records, while deformity was marked absent, and in the presence of deformity you can almost make the diagnosis across the room.

It is interesting to see how closely the chauffeur's fracture percentages follow those of Colles', except in the deformity and relation of styloid processes. Here there is a wide difference in favor of the chauffeur's, which agrees with our general impression that fractures from a kick back are less serious than those from a fall.

In separation of the epiphysis there is less injury to the soft parts and consequently less swelling and ecchymosis. There is no impaction and so no raising of the radial styloid. Crepitus is a rare symptom, and when present is due to the fact that a small chip has been broken from the diaphysis.

The diagnosis of the other fractures is very difficult without an X-ray (except that of the styloid of the radius, where the line of direct tenderness can be followed on three sides), as the definite symptoms are seldom present.

Treatment and Results in the Two Hundred Cases of Colles' Fracture

TABLE VII

Reduced under anæsthetic	38 per cent
Reduced without anæsthetic	23 per cent
Reduction considered unnecessary	34 per cent
Patient in poor shape for reduction	2 per cent
Reduction refused	3 per cent

Nine cases were reduced on the day of injury; 13 were reduced on the second day, etc., as shown in the following table:

TABLE VIII

	Day														
	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th
Cases.	9	13	23	29	12	8	2	3	2	0	1	1	1	3	2

Immobilization was obtained in a majority of cases by the use of a circular plaster bandage extending from the elbow to the tips of the metacarpal bones. In the other cases anterior wooden splints; or anterior, or anterior and posterior moulded plaster splints were used, of the same length as the circular plaster. The percentages are as follows:

TABLE IX

Circular plaster following reduction	45 per cent
Circular plaster without reduction	12 per cent
Other splints following reduction	16 per cent
Other splints without reduction	27 per cent

The circular plaster was applied as follows. First a piece of muslin bandage is placed longitudinally along the ulnar side of the forearm and hand next to the skin. Then several layers of gauze bandage are wound firmly around the forearm and hand. This is to keep the plaster from touching the skin and to supply an absorbent material. Finally, the plaster bandages are applied, putting them on snugly and rapidly, two 3-inch rollers being sufficient. Then, quickly, before the plaster has had

time to set, the wrist is grasped and pressure is applied, denting the plaster in such a way as to prevent a recurrence of the displacement. This pressure at the same time rereduces the fracture if displacement has recurred during the application of the plaster. The ball of the surgeon's thumb presses the lower fragment forward and inward, the fingers of the other hand pull the upper fragment backward, and his bent knee serves as the means of support to the wrist during this procedure.

After it has hardened, the cast is cut down along its ulnar side and the strip of muslin is pulled out sideways through the opening. This piece of muslin serves two purposes: it aids in cutting the plaster and especially the gauze; and also (a consideration of great importance) its removal sideways through the slit in the plaster insures that absolutely everything has been cut through and that nothing is left to bridge the cut and so prevent the expansion of the cast. The cast is then trimmed top and bottom and a firm gauze bandage applied. The patient is instructed to take off this bandage and to pry open the cast a little if it becomes too tight. During the six years that this splint has been used there have been no pressure sores from the denting of the plaster and no cases of ischæmic paralysis.

The duration of immobilization, counting from the day of *injury*, was:

TABLE X

Weeks						
2	2½	3	3½	4	4½ or over	Not recorded
6%	11%	29%	19%	5%	7%	23%

Baking, massage, and passive motion were given in 44 per cent of cases, beginning usually just after the discontinuance of the splints. The wrist was often strapped or bandaged, after the removal of the splints, to give it a little support for a week or so.

The normal period for immobilization was from three to three and one-half weeks after injury. Where the time was shorter, it was usually because the fracture had been one without displacement. Where the time was longer, it was because the reduction was very late, because the wrist was still very tender, or because the patient had not returned for treatment at the proper time.

The results in these 200 cases were:

TABLE XI

Anatomical results:		
Good	65	per cent
Fair (moderate deformity)	12	per cent
Poor (great deformity)	4	per cent
No record	19	per cent
Functional results:		
Good	58	per cent
Fair (*i. e.*, slow)	17	per cent
Poor (*i. e.*, very slow)	3½	per cent
No record	21	per cent

The cases with no records of results were those that discontinued treatment before they were discharged by the surgeon. Most of them can be considered good, at least functionally, for the usual reason for discontinuing

their visits at this stage of the treatment is that the patients do not see any necessity for further attendance and are anxious to get back to work. In a great many cases there is no further record after the splints have been removed and the patient has been referred to the massage-room.

Doctor J. A. McCreery has worked up a table showing the functional results of Colles' fracture during the year 1914.

The duration of immobilization has been:

TABLE XII

None	Two weeks	From 2½ to 3½ weeks	Four or over	Not recorded
6%	13%	41%	21%	19%

The percentage of cases with slow, or very slow, return of function is 21. Baking, massage, and passive motion were used in 32 per cent of the cases. It was almost invariably the milder cases, that is, those without injury to the soft parts, joints, etc., that needed the least immobilization and showed the quickest functional recovery. The cases with considerable joint reaction required longer immobilization on account of pain; and their slower functional recovery was due, in our opinion, not to longer immobilization, but to the condition of the joints.

We now come to a closer analysis of the imperfect results, both anatomical and functional, following Colles's fracture. In order to obtain the advantage of an increased amount of material, we shall consider all the

imperfect results following Colles' fracture, which occurred during a period of about four years; these include, of course, those cases (in Table XI) which form part of the 200 series.

The analysis of the imperfect anatomical results, 55 cases in all, including both those with great and those with moderate deformity, shows the following facts:

TABLE XIII

	Cases
Deformity great	11
Deformity moderate	44
Reduced under anæsthetic	20
Reduced without anæsthetic	18
Reduction considered unnecessary	6
Reduction refused	4
Reduction thought unwise	7
Circular plaster	38
Splints	15
Patient loosened splints too much	3
Good functional results	37
Fair functional results	15
Poor functional results	3
Radial displacement mostly	21
Dorsal displacement mostly	16
X-ray showed impaction	13

Of the 11 cases of great deformity, the apparent cause in 3 cases was that the patient had so loosened

the splints that they had ceased to act as splints. In 4 cases the patient refused reduction; in 1 case the patient was very old and it was thought wiser not to do anything. In 2 cases there was considerable impaction. In 1 case no adequate reason could be found, though the reduction was not done under an anæsthetic. The functional results of these cases were 8 good, 2 fair, and 1 poor, which gives a little better percentage than the combined results of the cases with great and those with moderate deformity, as given in Table XIII. This tends to show that the amount of deformity has but little effect on function.

The combined table (Table XIII) of the fair and poor anatomical result shows a percentage of 33 fair or poor functional results (slow, or very slow) as compared with the 20½ per cent of the 200 cases of Colles' (Table XI). This difference cannot, however, be laid entirely at the door of the unreduced deformity. It is, at least partly, due to the undoubtedly increased percentage, in these cases, of joint and soft-part injury, due to greater violence.

Attention should be called to the ratio between the cases reduced with anæsthesia and those without, 20 to 18; while in the series of 200 cases it was 38 to 23 (Table VII), which shows the advantage of anæsthesia in getting good anatomical results.

The ratio between the radial and dorsal elements in the deformity is also important. In Colles' fracture the dorsal displacement is more frequent than the radial, and as a rule much more pronounced, yet these results show a greater tendency toward radial displacement than toward dorsal. This is due to the fact that at the

time of reduction the dorsal displacement is the more evident. The radial displacement may not show at all (I am not referring to the X-ray picture) until the dorsal displacement has been reduced, and even then it may be obscured by the swelling. Consequently, unless special attention is given to the radial displacement, the reduction is likely to be incomplete in its respect. In the foregoing table (Table XIII) there were only 4 cases of dorsal displacement in which a reduction had been done under an anæsthetic, the splints had not been unduly loosened, and in which there had not been marked impaction.

Impaction, of which there were 13 cases, or 24 per cent, is in itself a serious obstacle to perfect reduction. By impaction I do not mean only the sticking together of the fragments, but more particularly the pulverizing, splitting, and broadening of the bone at the site of fracture, which is the result of impaction and which, if extensive, causes a permanent shortening of the radius. When the impaction is more extensive posteriorly than anteriorly, it is almost impossible to prevent a slight backward tilting of the lower fragment.

During four years there were 69 cases in which the return of function was delayed. The standard used was a total of 60 degrees in combined flexion and extension of the wrist and a total of 90 degrees in combined pronation and supination at the end of a month from the time of injury, or from the time of reduction if the interval between the two was long. Anything no better than this was called a fair or poor result.

In 15 cases there was impairment of rotation only;

in 28 cases, of flexion and extension only;* and in 26 cases all movements were slow in returning.

TABLE XIV

	First class—rotation only	Second class—flexion and extension	Third class—all movements
Number of cases.....	15	28	26
Sex:			
Male.....	8	17	8
Female.....	7	11	18
Age:			
Second decade.....	1	0	0
Third decade.....	1	1	1
Fourth decade.....	7	5	4
Fifth decade.....	2	10	7
Sixth decade.....	3	7	8
Seventh decade.....	1	5	3
Eighth decade	0	0	2
Not given.....	0	0	1
Impaction in.....	40%	43%	46%
Comminution in.....	0	0	23%
Deformity:			
With impaction.....	13%	14%	12%
Without impaction...	13%	18%	15%

In the first class of cases, interference with rotation only, there is an injury to and often a distortion of the inferior radio-ulnar joint. This also occurs in the third class of cases, tabulated above, but there a number of other factors complicate the condition. In the first class, however, it is almost wholly a question of injury to this joint. It is interesting to note the comparatively early age at which, on the average, this injury occurs.

* Adduction and abduction are not considered here. In general they correspond with flexion and extension as regards the return of function.

In the second class of cases, in which the movements of flexion, extension, etc., are alone involved, it is evident that the wrist joint proper has received the greater traumatism, while the radio-ulnar joint has escaped. There is nothing in the above table to show why there should be this difference. Perhaps a more careful study of the X-ray pictures taken before reduction might help to an explanation.

In both cases there is a high percentage of impaction, much higher than in the cases of anatomically imperfect results, where the number was 13 in 55 cases, or 24 per cent (Table XIII). Impaction means great violence with considerable bruising of the wrist joint, through which the force is transmitted, and it also results in a permanent distortion of the inferior radio-ulnar joint. The percentage of unreduced deformity is twice as high as in the 200 consecutive cases (Table XI). The effect of deformity on the inferior radio-ulnar joint would be to distort it and consequently to interfere with its function. Its effect on the wrist joint is harder to determine. It may in some way interfere mechanically with the action of the tendons, or it may, like the disturbance of function, be the result of the severity of the injury, the surgeon being hampered in his efforts at reduction by the presence of a great deal of swelling.

I have not gone into the question of immobilization, massage, etc., because the treatment in these respects was practically the same in both classes of cases, and it is difficult to see how they could have determined the type of disability.

The third class comprises those cases in which both wrist joint and the inferior radio-ulnar joint happened

to be affected, and also the cases in which a new element entered—a stiffening of the joints of the fingers. This new element, for the sake of giving it a name instead of always using a description, we have called "trophic disturbance." Owing, probably, to the presence of these cases, the average age of the patients in the third class is greater than in the others. It is ten years greater than in the 200 series, where the fourth and fifth decades show the greatest number of cases (Table II). As regards sex, this class corresponds pretty closely with the fifth and sixth decades in the 200 series (Table II). It is interesting to observe the high percentage of cases with impaction and the 23 per cent of cases with comminution.

The cases which, for want of a better name, we have called "trophic cases" require a separate analysis, for they give a perfectly distinct clinical picture. They are the cases with the shiny hands, with the stiff fingers, and with the almost immovable wrists. They defy treatment, and time seems their only remedy. They are the cases which are called "poor" in the statistics of functional results (Table XI).

In the fracture service of the Out-Patient Department there were treated 24 such cases following Colles' fracture in four years. Of these, 10 were mild, recovering in two or three months, and 14 were severe. Among them there were 6 severe cases which came to us for treatment for this condition from several weeks to three months after sustaining their fractures.

For further study the 14 severe cases have been selected. Their etiology is not clear, but the following table may help to show some of the factors:

TABLE XV

Cases	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Men	..	..	..	1	..	..	..	..	..	..	..	..	1	..
Women	1	1	1	..	1	1	1	1	1	1	1	1	..	1
Ages	40	38	54	57	59	34	48	58	54	40	28	59	44	61
Reduced	..	1	..	1	1	1	..	1	..	..	..	..	..	..
Reduction thought unnecessary	1	..	1	..	..	..	1	..	..	..	..	..	..	..
Too late for reduction	..	..	..	..	..	..	..	..	1	1	..	..	..	..
Great displacement (original)	..	1	..	1	1	1	..	1	1	..	..	..	..	1
Considerable deformity (result)	..	..	..	..	1	1	..	..	1	..	..	..	..	1
Marked impaction	1	1	1	..	1	1	..	1	1	†?	†?	†?	1	1
Comminution	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Cast too tight	..	1	..	*l	..	*l	..	..	..	..	..	..	1	..
Great deal of swelling	1	..	..	..	1	1	..	1	1	1	..	..	1	..
History of chronic rheumatism	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Day condition was noticed	21	20	25	3	18	27	30	10	3	3	..	28	..	..
Day massage was started	21	20	25	23	18	21	60	60	..	..	..	..	..	..

* *l* means that the patient loosened the cast when it became too tight.
† means that X-ray findings are not known.

The last 6 cases were the ones that came to the dispensary late. "I" came six weeks after injury; "J" nine weeks; "K" was a hospital case, compound fracture, with a fracture of the humerus on the same side as well; "L" was a hospital case, late open reduction. The hand was useless before the open reduction, which was done two months after the injury. "M" came three months after injury, and "N," six weeks.

It will be noticed, in the first place, that the proportion of women to men is 6 to 1. Also the age of the patient is important. The average age is 48 years—50 years, if the case of the compound fracture is disregarded. Of the 8 cases treated at the dispensary from the outset, 5 showed considerable displacement of the

lower fragment. Attempts at reduction were made in all, but were unsuccessful in 2 cases. Both of these cases had marked impaction and 1 was comminuted. Of the 3 cases which did not seem to require reduction, 2 were badly impacted. Marked impaction was a feature of 6 out of the 8 cases and in at least 3 of the 6 late cases, and in the other 3 there is no record of X-ray findings.

There is only 1 case of comminution, which is rather surprising, considering the fairly high percentage of cases with comminution in the total list of cases with impairment of function at both wrist and inferior radio-ulnar joints (Class III, Table XIV).

In 4 cases out of the 14 the casts, or splints, became too tight; in 2 cases the patient, following instructions, loosened them (marked "*l*," Table XV); in 2 cases they did not. In 7 cases the records speak of very marked swelling at the wrist following the injury.

Combining these elements, we find that of the 12 cases in which we have fairly definite information concerning the original injury, 11 showed either marked impaction, or splints which were too tight, or a great deal of swelling. It seems that possibly the swelling is the most important factor, and that possibly the presence of great displacement and of impaction is merely indicative of the violence of the trauma and the extent of injury to which the soft parts have been subjected, with a corresponding amount of swelling as the result. This seems most probable because it is hard to understand how the lesion in the radius itself could cause pathological changes in structures distal to it which were not injured by the original violence.

To recapitulate: this condition is likely to occur

when a person, usually a woman, past middle life sustains a severe Colles' fracture with impaction, injury to the soft parts, and a great deal of swelling. The swelling may do damage by causing constriction either by the splints or by the tense skin, which cannot stretch enough to relieve the pressure.

It is usually about at the end of the third week after the injury that it is first noticed that the recovery from the fracture is not progressing favorably, though on being questioned the patient may say that she has not been able to move the fingers since the third or fourth day of the injury.

The hand, on examination, shows the following features. There is swelling of the hand and wrist, moderate in amount, equally distributed in front and back, and not changing much the normal contours. The fingers and thumb are somewhat swollen at their bases, but not at their tips; they are fixed in semiflexion, or almost complete extension, all the joints sharing equally in what degree of flexion there is.

The skin of the entire hand is shiny, rather red, or occasionally bluish-red, and the normal wrinkles are obliterated. The bases of the nails appear elevated.

On palpation there is often an increase in surface temperature; there is moderate tenderness over the wrist and over the joints of the fingers. The swelling is found to be hard, not soft; rather an induration. It cannot be localized in any definite structure or tissue, but seems to involve all the soft parts except the skin. It is not tender; it cannot be diminished by massage. Movements at the wrist and inferior radio-ulnar joints are very much restricted and very painful; the same

with the fingers. Active motion is almost entirely lost, and passive motion is little better. An X-ray shows atrophy of all the bones of the wrist and hand.

What the pathological conditions are it is impossible to say. It is not an ischæmic paralysis, for the clinical picture is entirely different, and, besides, the constriction was at the wrist and not over the muscles of the forearm. It is apparently not due to too long immobilization, for in only 1 case were the fingers immobilized at all, and in 1 case (case "N" on the chart) there had been no treatment of the fracture. It is not an involvement of the tendons in the callus, for it is impossible to increase the motion of, say extension in, any one joint of a finger by flexing the wrist and the other joints of that finger. (This difference was clearly demonstrated in a case of laceration of the wrist with involvement of tendons, where, after healing, the tendons were firmly fixed in the scar.)

The immediate cause of the disability seems to be the thickening of the capsules of the joints and of the walls of the tendon sheaths, which thickening is part of the general induration of the soft parts. The intermediate cause may be a disturbance of the blood supply, an injury to the trophic nerves, or a chronic inflammation of some sort. As has already been suggested, the ultimate cause may be a constriction at the wrist caused by the resistance of the skin, or splints, to the swelling.

This condition of the hand has been observed in one of our cases of "T" fracture of the lower end of the humerus, with extensive injury to the soft parts and a great deal of swelling. The muscles of the forearm were apparently not involved. This condition, or some-

thing similar, has also been seen in several cases of pyogenic infection of the fingers, appearing in the sound fingers during the convalescence of the infected one.

The treatment of these hands is very discouraging both to the patient and to the surgeon. The only definite conclusion that we have reached is that passive motion is harmful. It increases the pain and tenderness and it decreases the range of motion. Baking and massage seem to have no effect. Vigorous massage does harm. The salicylates, potassium iodide, calcium lactate, extract of thyroid, and extract of thymus have been tried with on apparent effect. In the cases in which it was tried, electricity seemed to do some good. Improvement is very slow, but, if care is taken not to traumatize the joints, it does take place; and it can be predicted that at the end of a year, if not before, the hand will have returned to about normal.

RENAL TUBERCULOSIS

A Review of Thirty-Six Cases Operated Upon by the Surgical Staff of The Roosevelt Hospital

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This report comprises the observations made on a series of 36 cases of renal tuberculosis, in which the kidney infection was the essential condition, and which came to operation. In 34 of these cases nephrectomy was done. In 1 case a nephrotomy was performed on one side, because of persistent and severe pain on that side, coupled with the fact that the patient was rapidly losing strength. The opposite kidney was involved to such an extent that nephrectomy was considered not advisable. One large abscess with a secondary colon infection and 4 smaller tubercular abscesses were opened and drained. The patient did not improve, but died after a period of several weeks. In another case with a long-standing history of tubercular involvement of the urogenital tract, cystoscopy was impossible because of a tight urethral stricture. Suprapubic cystotomy was performed and a ureteral catheterization then done as a preliminary step to nephrectomy, it being felt that a tubercular renal infection was the primary infection. The demonstration of the involvement of both kidneys precluded in this case any further surgical interference. This report comprises only those cases that came to

operation; a few cases of bilateral renal tuberculosis are not included in this series, nor are those cases of unilateral tuberculosis which refused operation, or which were considered, because of other tubercular lesions, to be cases not suitable for nephrectomy.

The cases may be grouped from the histories and symptoms into three general classes:

First: The usual type of chronic tubercular pyelonephritis, comprising 28 cases, or nearly 80 per cent, presenting the symptom complex of urinary frequency and urgency, dysuria, loss of weight and strength, pain in back or kidney region, or in bladder or penis, occasional fever, chills and sweats, hematuria, pyuria and tubercle bacilli in the urine.

Secondly: A generally unrecognized type in which a kidney tumor, often rapidly increasing in size, and acute symptoms of marked systemic infection are the predominating symptoms. In these cases an acute septic pyonephrosis is superimposed upon a chronic and usually unrecognized pre-existing tubercular pyelonephritis. Of this type there have been 5 cases, or nearly 14 per cent.

The first case gave a history of long-continued urinary frequency and urgency with clear urine, and a two weeks' history of a dull boring pain in the left costovertebral space, and the appearance of a large, tender, rapidly increasing mass in the same region. At operation a large pyonephrotic sac was found with a chronic tubercular kidney. The patient made a good recovery.

The second case gave a history of frequency and urgency with turbid urine extending over many months. Palliative treatment had been tried with the usual

Fig. II. Tuberculous pyelonephritis with calculi.

Fig. III. Tuberculous pyelonephritis.

Fig. IV. Tuberculous pyelonephritis. No symptoms present.

indifferent success. A large tender mass was felt in the right kidney region. Cystoscopy showed the left kidney also involved. The patient ran a septic, up-and-down temperature, rising as high as 104.4°, and the blood count was 24,400 with 88 per cent polynuclears. Nephrectomy was done, despite the condition of the other kidney, in the hope of saving the life of the patient. She was desperately ill after the operation, but finally rallied and then gained rapidly in weight and strength with a marked improvement in her symptoms. She did well until she became pregnant some months later, after which she failed rapidly in weight and strength, suffered severely from an increase of the bladder symptoms, and died after re-admission to the hospital.

The third case had no pain, but some pus in the urine, temperature up to 104.6°, and blood count of 26,000 with 86 per cent polynuclears. She had been treated in two hospitals over a period of some weeks, evidently no diagnosis having been made. A cystoscopic examination immediately cleared up the doubt in this case. Ten months later her physician reports her condition as being very good.

The fourth case had severe pain in the right upper quadrant for four days, and a large mass was found in this region. Immediate operation after cystoscopic examination had revealed a pus flake exuding from the ureter. Result very good, the patient leaving the hospital in good condition.

The fifth case gave a four days' history of pain of varying severity in the lumbar region without previous symptoms. Blood count was 13,000 with 69 per cent polynuclears. Left the hospital in good condition, but

within a short time developed tubercular lesions in other organs.

In each of the above cases there was found at operation a large pus sac on a chronic tubercular lesion.

Thirdly: Cases coming to the hospital for other conditions, the renal lesion not being suspected, and being discovered only as a result of the routine examination. Three cases of this type came to operation.

The first case came to the hospital because of an incarcerated hernia. A small quantity of pus was found in the urine. The further history was then elicited that some months previously he had applied at a hospital for treatment because of hematuria, but after several cystoscopic examinations and a suprapubic puncture for a retrocatheterization of the urethra, he was discharged as being not a case for hospital treatment.

The second case had been ill for about six weeks with fever, chills, and prostration, and the diagnosis of a paratyphoid infection had been made. Apparent recovery had been followed by a relapse. Many urine examinations had been made, all with negative results reported. After removal to the hospital a few pus cells were found in the urine, and then the patient remembered that he had passed a few small calculi by urethra, after a second attack of renal colic about a year previous to the onset of his present trouble.

The third case had pain in the back for which he had sought relief for some years without success. A nephropexy had been done a few years previously.

In these cases the cystoscopic findings were essentially the same, namely, a bladder practically normal in appearance, the intravesical portion of the ureter

Pelvic Aspect. Convex Surface.

Fig. V. Tuberculous pyonephrosis. Duration of symptoms, five days.

thickened, tortuous, and retracted, pulling the ureteric orifice upward and outward so that it was higher and further from the median line than the opposite orifice. In all 3 cases a nephrectomy was done, and each kidney showed chronic tubercular lesions evidently of long standing. Had these cases not been recognized it is probable that they would in time have changed in character, and presented symptoms referable to and suggestive of a tubercular renal infection, so that they would then have been grouped in either of the first two classes. The following up of the very slight clews presented in these cases made possible a very early diagnosis. While not unanimous, the consensus of opinion to-day is that nephrectomy is the only rational treatment for uncomplicated unilateral renal tuberculosis. There does seem to be a decided tendency to progression of the tubercular process, even after an early nephrectomy, in a large number of cases. The earlier in the course of the disease that nephrectomy is done, and the more complete the removal of all the tubercular foci, the better the chance for complete recovery. It follows that early diagnosis is of the utmost importance. As to the necessity for complete removal of the ureter, there is not the same unanimity of opinion. Some maintain that partial removal is satisfactory and sufficient, others that complete removal is necessary. As complete removal can be done so readily in most cases it would seem that the latter is the better plan to follow. One case in which only a partial removal of the ureter had been done returned complaining of a persistence of all the symptoms. A complete ureterectomy was then done with very decided benefit, although not complete relief.

Sex.—Twenty-eight of the patients, or 80 per cent, were males, and 8 patients, or 20 per cent, were females. The accuracy of these proportions is open to criticism if applied to the general run of these cases. Many women with the symptoms of renal tuberculosis apply for treatment to hospitals restricted to the treatment of women exclusively. The consideration of these cases would in all probability radically alter the percentage given in this series.

Age.—It will be noted that over 62 per cent of the cases occurred in patients between the ages of 15 and 25 years.

Between the ages of 10 and 15 years	1 patient
" " " 15 and 20 "	7 patients
" " " 20 and 25 "	13 "
" " " 25 and 30 "	3 "
" " " 30 and 35 "	5 "
" " " 35 and 40 "	4 "
" " " 40 and 45 "	2 "
" " " 45 and 50 "	1 patient
	36 patients

Nationality.—In a series of so few patients it would seem that the nationality of the patients is of small moment. Nineteen patients were born in the United States, 6 in the British Isles, 4 in Italy, and 1 each in Holland, Germany, Hungary, Finland, France, Armenia, and Hayti. Three of the patients were colored, the rest white. The nationality of the patients might be of importance in determining an idea of the environment of the patients as bearing on the etiology of the infection. In this series the elements of underfeeding, alcoholism,

etc., are decidedly of little importance. The patients were almost without exception well fed, well developed, and, for the most part, of an intelligent class.

Alcoholism.—Thirteen of the patients were total abstainers, 7 claimed to be very temperate, using alcoholic beverages only on unusual occasions, 3 used alcohol regularly, and 1 to great excess. In the histories of 7 patients no mention is made of this factor, and in these cases the youth of the patients would seem to preclude the use of alcohol at all. The use of alcohol certainly need have but minor consideration as an etiological factor.

Family History.—A history of tubercular infection in other members of the family was obtained in only 1 case, in which it was stated that the father and one sister of the patient had died of pulmonary tuberculosis.

Renal Calculi.—In 3 cases renal calculi may have been of etiological importance. In 1 case a calculus was found in the upper end of the ureter and several in the calices of a kidney showing the lesions of a chronic tubercular pyelonephritis. In this case there was what might be called a usual history of renal tuberculosis extending over six months, but nothing especially suggestive of renal or ureteral colic. One case had had three attacks of renal colic, eleven, ten, and nine years previously, and after each attack had passed calculi. He had been free of all symptoms for eight years before the onset of the symptoms of the tubercular infection. The third case had passed two small calculi one year previously, after a second attack of renal colic.

Venereal Diseases.—Of 19 males over 20 years of age, 1 had had gonorrhœa and a syphilitic chancre seven

years previously. Five others had had gonorrhœa, and, in 3 of these, symptoms of the gonorrhœal infection, frequency and urgency of urination, dysuria, and hematuria, had merged into and continued as symptoms of the tubercular infection.

Previous tubercular lesions are apparently the most important etiological factor. In 17 of the cases there was no obtainable history of a definite tubercular lesion existing prior to the onset of the renal symptoms. Two cases gave a history of persistent, painless, purulent discharge from the ears. These conditions may or may not have had some bearing on the cases, and are mentioned because it is well to bear in mind that the ear condition may have been tubercular. Seventeen of the cases gave a history of definite tubercular lesions, and it is of interest to note that of these only 1 gave a history of pulmonary tuberculosis. The occurrence of previous tubercular lesions is of sufficient importance to warrant giving the details in brief:

One case of pulmonary tuberculosis.

One case of tubercular arthritis of elbow lasting for seven years.

One case of three ischiorectal abscesses within nine years, and an abscess of the scrotum three years previously.

One case of one tubercular testicle removed six years previously.

One case of one tubercular testicle removed thirteen years previously, the patient at the time being two years old.

One case of tubercular arthritis of the elbow; tubercular epididymitis.

One case of double tubercular epididymitis for one year.

One case of tubercular epididymitis with sinus discharging for four years.

One case of tubercular osteomyelitis of thigh for six years; tubercular spine.

One case of tubercular glands of neck; many operations on both hips during childhood.

One case of tubercular epididymitis for four months.

One case of tubercular spine.

One case of tubercular glands of neck removed three years previously.

One case of perineal abscess lasting eight months two and a half years previously; cold abscess over sternum with sinus persisting.

One case of tubercular glands of neck.

One case of pleurisy fourteen years previously; panhysterectomy for tuberculosis two years previously.

One case of tubercular epididymitis, double.

Seven of the cases, it will be noted, had tubercular involvement of the epididymis, and 3 other patients, previously free from involvement of the epididymis, developed tuberculosis in those organs after nephrectomy.

Symptoms.—The principal symptoms are frequency and urgency of urination, dysuria, hematuria, pain over the kidney region, loss of weight, fever, and chills. The last three, being of least importance, will be disposed of first.

Loss of Weight.—Eight patients claimed to have lost no weight.

Fifteen patients did not know whether they had or had not.

Two patients claimed a marked loss of weight, 1 of these being quite emaciated.

Two patients claimed a moderate loss of weight.

One patient claimed a gain in weight since the onset of symptoms.

The other patients reported a loss of weight of 16, 40, 8, 15, 10, 14, 25, and 30 pounds.

Chills and fever were of minor importance in the symptomatology except in the cases classified in the second group, those with symptoms of mixed infection. Of the other cases 6 had had chills at some time in the course of the disease. One had had daily chills for a period of three weeks, previous to which time he had been perfectly well. Twenty-four cases reported no chills or chilly sensations at any time. Of the 31 chronic cases, 27 had noticed no fever; of the other 4, 3 had chills and fever, and 1 fever alone.

Hematuria.—Fifteen patients denied the presence of blood at any time. With 15 patients hematuria was present in association with other symptoms of urinary disturbance. In some patients the blood was mixed with the urine, with others it occurred as a terminal hematuria, and in others was passed in clots. Again, a combination of two or all three of these forms might be present in the same patient at different times. In these cases the hematuria accompanied other symptoms, the combination pointing strongly to the underlying condition. In 6 cases the hematuria stands out more prominently as compared to the other symptoms, in 2 cases being the only symptom noted, in 3 cases antedating all other symptoms for variable periods, and in 1 case being the most prominent symptom noted at any time.

Terminal hematuria occurring some months previously was the only symptom noted by 1 patient. A few drops of blood noticed on the clothes by the second patient preceded all other symptoms by three months. Hematuria, lasting for a few days only, preceded all other symptoms by six months in another instance. A few drops of blood seen on the clothes preceded all other symptoms by six weeks in the fourth case. Hematuria, noticed once only five years previously, was the only symptom ever noticed by 1 patient. The only complaint of this patient was pain in the back, and this was due to a tubercular spine. There had been no urinary symptoms. The diagnosis was made after a cystoscopic examination revealed a plugged ureter. In the sixth patient hematuria was noticed only once by the patient three years before the onset of any further symptoms.

It has been stated that hematuria is a symptom of minor importance in the symptomatology of renal tuberculosis, but the observations in this series of cases are not in accord with that statement. Hematuria was a prominent symptom in 60 per cent of the cases, and it was the only symptom present for an appreciable period in 6 of these cases.

Frequency and urgency of urination and dysuria are the most constant and noticeable as well as the most distressing symptoms. All but 8 of the patients complained more or less of some one or more of these symptoms. Of the 8 that did not, each one had a stenosed ureter on the infected side, and I believe that it would have been a matter of time only until these symptoms appeared. The occurrence of frequency, urgency, and painful urination in a young person, in the absence of a

gonorrhœal infection, points in many instances to a tubercular renal infection. Other conditions may of course cause these same symptoms, but, until another condition is proved to be the cause of them, the possibility and even the probability of a tubercular infection must not be overlooked or neglected.

The frequency complained of was of all degrees of severity, some patients finding it impossible to retain urine more than fifteen or twenty minutes at a time, the condition persisting day and night, and being influenced not at all, or to a slight extent only, by treatment. Some could retain urine comfortably for a period up to two hours, and a few with an effort could go three or even four hours. Again, other patients might retain urine comfortably for a comparatively long period, but could not retain it once the desire was felt to urinate, so insistent would be that desire. Incontinence occurred with some patients if they did not almost immediately heed the desire.

The pain also varied in character, severity, location, and duration, there being no apparent relationship between the severity or location of the pain and the extent of the renal involvement. Pain occurred before, during, or after urination, or any combination of these three times might occur. In some the pain came with the desire to urinate and was relieved by the act. In others the pain was made worse for a time by urination. Again, it might occur only during the act. The location of the pain was most frequently at the head of the penis, but might be in the back, perineum, groin, or bladder, or in two or more of these locations, the pain always connected with the act of urination. In one instance severe pain was felt in the region of the infected kidney with

every urination. With some, dysuria was a constant symptom; with others it occurred only at certain periods, occurring, for instance, in 1 patient only with hematuria. In severity it varied from a feeling of only moderate discomfort to that of intense severity or agonizing tenesmus. Some patients with clear urine and no discoverable bladder lesion might have intense and excruciating pain with every urination; others with very turbid urine containing blood, pus, and tubercle bacilli would suffer much less. The persistence of the frequency, urgency, and dysuria after operation is perhaps the most unsatisfactory and discouraging factor connected with the treatment of this condition. It would seem that the removal of the kidney and the entire ureter, with a bladder that appears almost if not entirely clear, would result in a symptomatic cure. Such is certainly not the case. Although very decided improvement may occur, it is the exception to have a patient entirely free from these symptoms if they were present before.

This raises the question as to whether these symptoms when present may not be due to involvement of other organs—prostate, seminal vesicles, bladder wall, etc., possibly to a very slight extent, the extension being along the lymphatics, instead of being simply a reflex sign of the kidney involvement. The persistence after operation of these most distressing symptoms is at least an indication for early diagnosis and operation, and certainly the best results are to be expected when the diagnosis is made and the proper treatment instituted before the onset of bladder irritability.

Pain Not Associated with Urination.—Thirteen patients were free from any pain referable to the kidney or ureter. Of these, 6 had ureters that were readily

catheterized. The other 7 had been cystoscoped, the opposite side readily catheterized in each instance, but it was found impossible to pass any instruments up the ureters of the infected kidneys. One patient had severe pain in the region of the involved kidney, of very sudden onset, and accompanied by the passage by urethra of blood clots and small portions of tissue. The pain was very suggestive of renal colic due to stone. Cystoscopy was impossible because of the extreme bladder irritability, but the diagnosis of renal tuberculosis was made and verified at operation, one small necrotic area and many tubercles being found in the kidney. One patient referred to above had severe and persistent pain in the back, for which a nephropexy had been done a few years previously without benefit. A stenosed ureter being found, the diagnosis of renal tuberculosis was made, and at operation the kidney was found entirely destroyed. No improvement followed until after the application of a spinal cast. One patient complained of pain in the hip of the involved side, the pain occurring eight months after the onset of the bladder symptoms and lasting for two months; but it was not present for the four months preceding admission to the hospital. The onset of the pain was accompanied by daily chills and fever. One patient who had no urinary symptoms had suffered for almost a year from dull pain in the right upper quadrant of the abdomen, the pain radiating to the right scapula and to the right lumbar region. During this time two severe attacks, each of one hour's duration, had occurred. Each of the other 19 patients had had pain referred to the region of the involved kidney at some time in the course of the illness. With some it was continuous, with

others at intervals only; with some severe, with others slight; fixed in some instances, and in others radiating down to the bladder, groin, or side. In 1 case the pain was relieved by exercise; in other cases rest and certain positions would cause a disappearance or a diminution in the severity of the pain.

It is to be noted that nearly 66 per cent of the patients had, at some time in the course of the infection, pain in the kidney region. In many cases this pain was severe. This pain had no connection with the pain connected with the act of urination.

Temperature.—Twenty-three patients had temperature charts noting a practically flat temperature while in the hospital before operation or cystoscopy. The latter procedure in several instances was followed by a rise of temperature lasting a variable period. One case was admitted to the hospital after a cystoscopic examination, with a temperature going up to 102°, stating that it had been flat before the examination. One case had an up-and-down septic temperature, at times reaching 103°. At operation there was found a colon infection of a chronic tubercular abscess. One patient had a temperature running up to 101.4°, but had previously had a double decapsulation and had a sinus running down to one kidney. One patient, noted above as having daily chills and fever, had a temperature up to 105.2°. He stated that he had had malaria some years before. Repeated examinations for malarial organisms were unsuccessful. The Widal test and blood cultures were negative. Four other cases had maximum temperatures of 99.8°, 100.2°, 100°, and 100.4°, respectively.

Of the chronic cases 23 patients, or 75 per cent, had no

rise of temperature at any time while under observation, and 5 additional cases, or 11 per cent, had a temperature under 101°.

Blood Counts.—In 13 cases of the chronic type the white blood count averaged 9,950 with an average of 72 per cent of polynuclear cells. One case had 26,000 with 78 per cent polynuclears, and 1 case, previously mentioned, complicated with a colon infection and running a septic temperature, had 28,000 cells with 89 per cent polynuclears. However, the majority of cases have counts that come within, or very nearly within, the normal limits.

Tuberculin Reactions.—The von Pirquet test was made in 17 cases, being positive in 15 and negative in 2 cases. The Moro test was made once, being positive, and the Calmette conjunctival instillation was used in 1 patient, a very strong reaction being obtained.

Tubercle bacilli were found in the urine of 19 cases. In 17 cases the tubercle was not found. Five of these were the cases in the second group with symptoms of acute septic infection, and of the 12 remaining cases 11 had stenosed ureters, so that very little or no exudate was coming from the infected side. In only 1 instance, where the ureter of the involved side was patent, was the search for the tubercle bacilli unsuccessful, and it is quite possible that a continued search might have been successful in this case. Other symptoms made it possible to make a positive diagnosis in this particular instance, and a nephrectomy was performed without the confirmation that would have been furnished by a positive finding.

A cystoscopic examination was attempted in 34 cases. In 3 of these the examination was unproductive of re-

sults because of technical difficulties. In 1 case a tight urethral stricture prevented the use of the cystoscope. A double ureteral catheterization was done later through a cystotomy opening. In 2 other cases the extreme bladder irritability prevented the introduction of any fluid into the bladder after the cystoscope had been passed. The diagnosis of renal tuberculosis was made in each of these 2 cases and verified at operation. In each case it was necessary to perform a nephrectomy without knowledge of the condition of the other kidney. In 1 instance it was done as the only measure sufficient to save the life of the patient. In the other instance an exploratory nephrotomy of the other kidney was planned in case the suspected kidney was found to be involved, but the accidental rupture of one of the blood-vessels of the pedicle necessitated immediate nephrectomy to stop the hemorrhage. Fortunately both cases recovered. In 2 cases both sides were found involved, in each instance one kidney to a far greater extent than the other. In the first case nephrectomy seemed warranted, despite the double involvement, to save the life of the patient. For a period of some days after the operation the outcome was in doubt, but recovery finally occurred, and the patient gained greatly in weight and strength, with marked diminution of the bladder symptoms. In the other case a nephrotomy was done for drainage, as the patient was losing ground continually. The operation did not improve conditions at all, and the patient continued to lose and died soon after. In 3 cases practically no symptoms of renal involvement were elicited by the ordinary examinations. One case previously mentioned had pain in the back due to a spinal tuberculosis. Urine

was negative. The discovery of a thickened stenosed ureter was followed by operation and the removal of a destroyed tubercular kidney. The detection of a small amount of pus in the routine urinalysis of the other 2 cases resulted also in the removal of tubercular kidneys, after the discovery of a thickened stenosed ureter in each case. In 11 cases the bladder symptoms of frequency, urgency, and dysuria were present, with possibly the demonstration of pus, blood, and tubercle bacilli in the urine, so that a renal tuberculosis was suggested, but no symptoms of pain or tenderness to localize the involved kidney. Of these 11 cases, 5 showed blood, pus, or tubercle bacilli from one kidney with clear urine from the opposite side. In the other 6 cases, clear urine was obtained from one kidney, and in each instance the opposite ureter was stenosed and thickened.

In all cases where it is found impossible to catheterize one side, the following technic is used. At a later cystoscopic examination, under general anæsthesia if necessary, usually with a single catheterizing instrument, repeated attempts are made to pass a catheter, bougie, or whalebone filiform up the infected side if the orifice can be identified. If this fails or the orifice cannot be identified, close observation of this region is maintained for a period of one hour after the beginning of the secretion of a dye from the opposite kidney. Either indigocarmine or methylene blue is used. Of the former from 2 to 4 c.c. of a 4 per cent solution are injected subcutaneously. The disadvantage is the painful node persisting for some days at the site of the injection. Secretion of the dye on the normal side begins in from five to twenty minutes after injection, and the color of the urine gradually

changes to a very dark blue. Occasionally, from the infected side the escape of a few drops of colored fluid may be detected, but the difference between this and the frequent discharge of a darkly colored urine, sent in a large-size stream, with good force, from the opposite kidney, is so great that no difficulty is experienced in deciding that the difficulty of catheterization is due not to faulty technic, but to the presence of pathological conditions. If methylene blue is used, 15 gr. of the drug are given in divided doses, six, four, and two hours before the examination. The single catheterizing instrument is used, because it is decidedly less painful to the patient and much less likely to cause hemorrhage in the bladder during the examination. It is well, also, to restrict fluids for several hours before the examination, and then to have the patient drink a large quantity of water in the half-hour immediately preceding the examination. By doing this an intensely blue-stained urine is obtained.

Six cases gave subjective symptoms suggestive of the side affected. In these cases cystoscopy removed any doubt as to the conditions present. A stenosed ureter was found in each of 5 cases with practically clear urine from the opposite kidneys. In the other cases tubercle bacilli were found in the urine from one kidney, and clear urine from the opposite. In the other 9 cases the symptoms present pointed more or less accurately to the kidney involved. Cystoscopy was of value in these patients to determine the presence and the functional activity of the second kidney, and to demonstrate whether it was or was not involved in the tubercular process. One case had a discharging sinus

from a kidney that had previously been decapsulated, so that the only object of cystoscopy was to get information regarding the other kidney. Two of the remaining cases gave blood, pus, and tubercle from the involved kidney with clear urine from the opposite side. In the remaining 6 cases the ureter of the involved kidney was stenosed in each instance, the urine from the opposite side being clear.

Of the 31 cases cystoscoped, blood, pus, and tubercle bacilli from one side, with clear urine from the other, were demonstrated in 8 cases. In 2 cases a double tubercular infection was found. In 11 patients the ureteric orifice of the involved side was identified, but the ureter was stenosed in each case, in some just within or slightly above the orifice, in others higher up, the highest being 7 inches above the bladder. In each of these cases clear urine was obtained from the opposite kidney. In 1 case no attempt was made to catheterize the involved side. In the remaining 9 cases the bladder condition was such that identification of the orifice was not possible. Attempts to locate the orifice by the use of a catheter over the region that the orifice would normally occupy, and also the use of indigo-carmine or methylene blue, were alike unsuccessful.

It would seem that the presence of a stenosed ureter in over 68 per cent of these cases would make this point one of great value in diagnosis, and such I think it is. I feel now that it is of sufficient value to justify the diagnosis with very little corroborative evidence, it being assumed, of course, that other conditions, ureteral calculi, stricture, etc., which may result in ureteral obstruction, are ruled out, as they almost always can be after a full

consideration of all the factors connected with any given case.

The bladder conditions varied greatly, the severity of the bladder involvement bearing no apparent relationship to the extent of the kidney lesion.

The cystoscopic examination of most patients is rendered extremely difficult because of the intense intolerance of the bladder to distention. In many cases the introduction of as little fluid as 2 oz. causes an intense desire to empty the bladder, this desire being often so intense as to be beyond the power of the patient to control it, so that the fluid is ejected through the urethra outside of the examining instrument, or forced back through the tubing to the irrigating jar. This intense irritability seems to be relieved but little, if at all, by general narcosis, distention of the bladder being possible to a certain extent only with the patient well under the influence of the anæsthetic. The use of general anæsthesia is necessary only in exceptional cases, practically only for young patients, and for those who are extremely nervous. The hypodermatic administration of morphine before the examination, gentleness and rapidity, the use of a small instrument, and the avoidance of undue distention are all means to be employed to minimize the patient's discomfort. Two or three short examinations, catheterizing one ureter at each sitting, are to be preferred to one long examination and the attempt to obtain all the necessary information at one time.

Five patients were not inconvenienced by bladder distention in excess of 8 oz. during the cystoscopic examination. Of these, 3 had no bladder symptoms at any time and 1 had only slight burning at times. The fifth

had suffered severely from frequency and urgency of urination, but was not affected by the examination. Five patients were able to stand the introduction of fluid to the extent of 6 to 8 oz., although the distention caused discomfort and a desire to empty the bladder. In 21 cases the bladder tolerance is noted as being very poor. In 2 cases the intolerance was so marked that it was found impossible to proceed farther than the introduction of the instrument.

It is impossible to describe or classify the appearances presented by the vesical mucous membrane, no 2 cases being exactly alike in this respect. Some cases are practically normal, but there is usually some change, most likely in the region of the orifice of the involved side. There may be a limited area of congestion with possibly some discrete tubercles, or the process may have progressed to distinct ulceration with pus flakes adherent to the surface of the ulcer. The majority of these bladders manifest a distinct tendency to bleed readily, even in the absence of ulceration, thus adding to the difficulties of the procedure. As just mentioned, changes are apt to be localized about the orifice of the involved kidney. In 3 cases the orifice appeared normal; in 4 cases the surrounding mucous membrane was congested; in 3 cases the orifice was large and patulous, presenting the golf-hole or crater-like form; in 4 cases the orifice was at the apex of a thickened ureter and thus raised above the level of the surrounding bladder-wall. These descriptions account for only 14 cases, or 45 per cent of those examined. In the remaining cases the orifice could not be identified or seen clearly enough to get a definite idea of the appearance. Often it is possible to cathe-

terize a ureter when it is impossible to see clearly enough to describe the appearance presented at and about the orifice. For instance, the orifice may be at the bottom of a fold of mucous membrane, the membrane about it may be congested and edematous, or pus and blood may cloud the field, but knowing just about where the orifice should be, the passage of the catheter-tip over the bladder-wall in that region will often result in the engagement of the catheter in the orifice, and the passage of it up the ureter.

The following table gives the duration of symptoms before operation, the condition of the kidney as found at operation, the length of time since operation, and, when obtainable, the present condition of the patient. Where no record is made in the table, no information could be obtained.

Duration of symptoms	Condition of kidney at operation	Elapsed time since operation	Post-operative history
One month.	Entirely destroyed.	Nine months.	Reported by her physician as being well.
Six months.	Entirely destroyed. Several calculi present.		
Twenty-one months.	Multiple abscesses.		Died two years later.
One year.	Several tubercular abscesses.		Died three months later.
Five days.	Kidney replaced by pus sac.	Five years.	Left hospital in good health and apparently cured.
Three months.	One small area of necrosis.	Three years, nine months.	None obtainable after leaving hospital. Was then apparently cured.
Sixteen months.	Four tubercular abscesses and one colon abscess.		Died sixty-seven days after nephrotomy.
Three weeks.	Four small tubercular abscesses.	Fourteen months.	None since discharge from hospital.
Fourteen months with remission of one year free of symptoms.	Entirely destroyed.	Nine months.	Occasional blood-clots; urinates every twenty minutes during the day and six to twelve times at night; can retain one hour by an effort; gained 40 pounds.
Six weeks.	Many cavities.	Fifteen months.	Hematuria twice within first two months; no symptoms since then; feels well.
Two months.	Entirely destroyed.		Died eleven months after; extensive tubercular involvement.
Seven weeks.	Gross appearance normal, many young tubercles.	Nine months.	Double tubercular epididymitis; severe frequency and urgency with dysuria.
Fourteen months.	Entirely destroyed.	Seven months.	Has distress in bladder region; has gained in strength and health.

Four months.	Pelvis a pus sac communicating with abscesses extending well into parenchyma.	Eight months.	
Ten months.	Entirely destroyed.	Twelve months.	
Two months.	One small abscess; many tubercles.	Four months.	Has frequency, urgency, and dysuria. Better than before operation.
Twelve months.	Tubercles in pelvis and ureter.	Twenty-six months.	Very considerable gain in weight. Tuberculosis of both epids. Blood, pus, and tubercle bacilli in urine. Marked frequency, urgency, and dysuria. Pain in other kidney.
Eight months.	Upper pole of kidney a pus sac.	Twenty-six months.	Reported a few months after operation as being improved. No trace of patient since.
Eight months.	Two large abscess cavities; many tubercles.	Twelve months.	No trace of patient since.
Three months.	Many abscess cavities with kidney tissue between.	Twenty-two months.	Urinates during day every two and a half hours; twice at night; weight increase of 8 pounds. Lately increased frequency.
Thirteen months, possibly six years.	Replaced by pus sac.	Thirty-one months.	Decided increase of weight. Every six weeks voids small blood-clot. Urine repeatedly negative for tubercle.
Seven months.	Abscess upper pole.	Four years.	No trace of patient.
Seven months.	Upper pole a tubercular cavity.	Forty-three months.	Quite well until lately. Now blood, pus, and tubercle from other kidney. Severe subjective symptoms.
Nine months.	Two cavities in upper pole.	Fourteen months.	No symptoms; gained 8 pounds.
Two months.	Many caseous areas.	Forty months.	Gained 5 pounds in weight. Urinates every hour. Dysuria if held too long. Always pain after. Occasional blood-clot.
Four months.		Five years.	Five weeks ago returned with frequent, painful urination. Pus in urine; tubercle bacilli not found.

Duration of symptoms	Condition of kidney at operation	Elapsed time since operation	Post-operative history
No symptoms.	Entirely destroyed.	Forty-two months.	Gained 10 lbs. Twenty-four-hour quantity 52 oz. Retains up to twelve hours. No pain; urine clear.
Two weeks.	Entirely destroyed.	Nineteen months.	Urine contains much pus and many tubercle bacilli.
No symptoms.	Many abscess cavities.	Three months.	No urinary symptoms. Gained weight and strength.
Three months, possibly three years.	Riddled with abscesses.	Five years.	Double tubercular epididymitis. Hematuria; nocturnal incontinence. Pain in kidney region. Urinates every two hours.
Four days.	Entirely destroyed.	Five years.	Many tubercular lesions soon after operation. Was losing ground when last seen.
Four years.	Many tubercles scattered through kidney.		Died soon after discharge from hospital. Many tubercular lesions.
Two years.	Entirely destroyed.	Five years.	Seen one year ago. Frequency and urgency of urination almost gone. Had gained very much.
Nine months.	Riddled with tubercles.	Five years.	Reported as being very well.

A REPORT OF THE ANÆSTHESIAS ON THE SECOND SURGICAL DIVISION

The Roosevelt Hospital

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Following the introduction, in the fall of 1912, of the anæsthetometer, an apparatus devised by Doctor Karl Connell for use in the administration of ether by insufflation, this method of anæsthetization came into general use on the Second Surgical Division, Doctor Charles H. Peck, attending. For about one year previous to this the intratracheal delivery of ether had been used in selected cases with the Elsberg apparatus, and it was found to give a smooth, reliable, and safe anæsthesia, but, owing to the difficulty of intubation, which difficulty has since been largely overcome, the intratracheal method was hardly adapted for use in routine cases. With the substitution of the intrapharyngeal method by Dr. Connell, the administration of ether by insufflation was made a much simpler procedure, and its natural advantages over other routine methods of narcotization at once were recognized. Furthermore, this new device made it possible to deliver a definite percentage by weight of ether in air by mixing the proper amount of ether with a measured volume of air, which established a scientific basis for the administration of ether by the insufflation method. The apparatus was described by Doctor Con-

nell in the *Journal of Surgery, Gynecology and Obstetrics*, for August, 1913.

During the past year, except for the month of January, a careful record was kept of every anæsthesia given on the Division, including the general condition of the patient at the time of anæsthetization, the symptoms during the induction and the maintenance of the anæsthesia, and the subsequent history of the patient. There were in all 710 anæsthesias, including 411 by ether insufflation, of which 348 were given intrapharyngeally and 65 intratracheally; 110, chiefly children, by drop ether; 145 given ether with rebreathing, using the Bennett inhaler; 25 cases of nitrous-oxide gas and oxygen; 17 local anæsthesias; and a few short cases of straight nitrous-oxide gas. Chloroform was occasionally given to adults to supplement drop ether during a particularly difficult induction. The anæsthesias were administered by about twelve different men, including the clinical clerks from the College of Physicians and Surgeons; but all, except a few emergency cases, were under the direct supervision of the paid anæsthetist of the division.

For routine anæsthesia, intrapharyngeal insufflation with the Connell apparatus has proved to be a great advance over previous methods. The percentages have been carefully calculated by Doctor Connell and verified by other observers, so that after inserting the nasal tubes the anæsthetist has only to sit back and watch his patient, regulating the apparatus according to the required percentage. The induction is carried out by means of the nitrous-oxide-gas ether sequence, which offers a rapid and smooth induction that has proved satisfactory in the majority of cases. As soon as the pharyngeal reflex

has been abolished, which takes from eight to twelve minutes, depending upon the type of individual, the nasal tubes can be inserted and the insufflation anæsthesia started.

The tubes are No. 18 F. rubber catheters with two lateral openings and one at the tip. They are passed one through each nostril, or in cases of nasal obstruction, which usually exists in but one side, both through the same nostril, or, perhaps even better, one larger catheter through the unobstructed side down to a point behind the epiglottis, which allows the ether vapor to be delivered into the lower pharynx. In practically every case this overcomes any obstruction to respiration in the pharynx and forces out whatever mucus may have collected there, and it is surprising to see how readily drop ether, or rebreathing cases that are badly choked with mucus, will clear up with intrapharyngeal insufflation.

As soon as the tubes have been inserted, the average case requires for the next ten minutes 21 per cent by weight of ether in air; for the next five minutes, a percentage of 18; and by the end of half an hour, including the time of induction, the patient has been sufficiently saturated to carry indefinitely on 15½ per cent. The stronger type of individual often requires a percentage of 24 or 26 for the first five minutes, and the more susceptible type usually requires no higher than 18 per cent, but by the end of thirty or forty minutes each type has reached the point of saturation, and all react alike to a base line which is 15½ per cent. Practically the same percentages are required for intratracheal insufflation. Throughout the narcosis the control is perfect and the lightest possible depth of anæsthesia can be maintained.

About five or ten minutes before the operation is to be completed the ether is stopped, but the delivery of pure air into the pharynx is continued. This hastens recovery from the anæsthesia, and the patient, as a rule, arrives at the vomiting level in eight to ten minutes from the time the ether is discontinued.

The intratracheal insufflation of ether has been found indispensable in special cases, chiefly those involving the opening of the chest cavity, or in operations where there is likely to be a large quantity of blood in the mouth or pharynx, and even in routine cases, when properly managed, it offers the best method of etherization. Its chief disadvantage, however, is that it requires a deeper induction with full relaxation of the muscles of the neck to make possible the introduction of the intratracheal tube. Otherwise, it is necessary to use a mouth gag, which is not only an inconvenience but may result in damage to the teeth or in traumatism to the pharynx from the speculum. The actual introduction of the catheter is a comparatively simple procedure after the anæsthetist has once mastered the technic, which ordinarily requires only two or three attempts. Occasionally the presence of a large amount of mucus in the throat will obstruct the view and render the intubation more difficult, but the preliminary use of morphine and atropine will overcome this difficulty. For the intubation we make use of the Jackson laryngoscope with direct extension of the patient's head upon the operating table. This is an improvement over the old method of lowering the patient's head over the end of the table, a procedure which required at least two men for its accomplishment. This improved method was first de-

Fig. VI. Extension of neck for introduction of Jackson laryngoscope.

Fig. VII. Introduction of intratracheal catheter through Jackson laryngoscope.

scribed by Doctor Jackson, of Pittsburg, and the method which we employ differs but slightly from his. Instead of standing at the side of the patient, the anæsthetist stands at the head of the table with the patient's head directly in front of him. Direct extension is accomplished by the use of one hand (as shown in Fig. VI), and can easily be maintained with that same hand leaving the other free for manipulation of the speculum (as in Fig. VII), so that never is the service of the second person required, even where the relaxation is great; and in contrast to Jackson's experience we have found that the greater the relaxation the easier is the intubation, for with this improved method we have never had a case where the service of a second person was required. The speculum is introduced directly in the mid-line over the dorsum of the tongue and gently lifted until the epiglottis, which it is important to identify, comes into view. Maintaining the extension of the head, the speculum is passed just beyond the tip of the epiglottis, which, with the hyoid bone and its attached tissues, is lifted forward by means of the speculum so that the vocal cords may be seen. It is then a simple matter to pass the catheter, which has been stiffened with ice or cold water, directly into the larynx, which, in most cases, it can be seen to enter. With the first respiration there is a distinct whistling sound, or, if during the manipulation the patient has recovered the laryngeal reflex, coughing assures you that the catheter has entered the larynx. If by any chance the catheter should enter the esophagus, the stomach will gradually become distended, the patient will show signs of returning consciousness, and probably will vomit. The tendency here is to withdraw the

catheter, but this should not be done until the stomach has been emptied of air by pressure on the abdomen.

The proper distance for the catheter to be inserted is about three-quarters of an inch from the bifurcation of the trachea, generally 26 cm. from the incisor teeth. This can be determined by introducing the catheter until it meets an obstruction in one of the smaller bronchi and then withdrawing it 3 or 4 cm. It is important to use a catheter small enough to allow a sufficient return flow around it in order to avoid the possibility of causing too great an intrapulmonic pressure. One case has been reported where failure to do this led to very serious trouble. The anæsthetist should determine the size of the catheter to be used, and, because of the variation in size of the lumen of the trachea, he should have in readiness catheters varying from 18 F to 24 F. Ordinary silk lisle catheters have been found satisfactory, and 24 F is the size required for the average adult. For introduction the catheters are made stiff by placing them for a moment on ice or in cold water, and they readily become soft and pliable when warmed in the trachea.

In general, the post-anæsthetic course following intratracheal insufflation was smooth and free from any serious complications, and the 3 cases of bronchitis which developed after its use could be definitely attributed to pre-existing causes. In only 1 case was there any irritation of the trachea and in this instance the patient had been doing badly on drop ether, with mucus gurgling back and forth in the trachea, and the intubation was resorted to in order to relieve the condition, so that it is impossible to be sure that the catheter was the cause of the irritation. There was less vomiting after intra-

tracheal insufflation than after intrapharyngeal, and less than after any other method. After intratracheal, 47 per cent did not vomit; after intrapharyngeal, 46 per cent; and after all methods combined, except intratracheal, 46 per cent. Moreover, the vomiting was less persistent after the intratracheal method, there being no case that vomited after the first twenty-four hours, and many cases were not even nauseated. This was undoubtedly due to the fact that with a five or ten minute ventilation of the lungs at the close of the anæsthesia there was much less ether-laden mucus swallowed by the patient during the recovery.

However, as judged by our statistics, the character of the induction is a most important factor in post-anæsthetic vomiting. The smoother the induction, and the more rapid the dissociation at the vomiting centre, the easier was the recovery and the less vomiting occurred, but the more stormy the induction, with gagging and swallowing, and the more prolonged the period of dissociation at the vomiting centre, the more vomiting was observed and the period of nausea was longer. With the use of the nitrous-oxide-gas ether sequence, a smooth and rapid induction was usually accomplished, many of the cases losing consciousness on the third or fourth inspiration. In the average case consciousness was regained in one hour, but after intratracheal insufflation it was frequently less, and on more than one occasion as early as fifteen minutes. If vomiting occurred, it was during this period of recovery, or shortly after, but in no case was post-anæsthetic vomiting so persistent as to cause alarm. In a few cases vomiting continued in small amounts at intervals for two or three days, but

in every instance it was associated with a dilatation of the stomach which in no way could be attributed to the anæsthetic. As far as can be judged, there was no relation of the amount of vomiting to the depth of anæsthesia, or to the amount of anæsthetic used.

Preliminary morphine was not given as a routine because of the idiosyncrasy toward this drug of some patients in whom it causes a depression of the respiratory centre which often constitutes a real danger. But it is interesting to observe that, of the dozen or so cases that did have preliminary morphine, only 2 cases showed any post-anæsthetic vomiting. These results seem in accordance with the results of Doctor Crile's experiments, which showed that preliminary morphine lessens the degree of acidity of the blood produced by ether or nitrous-oxide anæsthesia, and Doctor Buckler, of Baltimore, is of the opinion that post-anæsthetic vomiting is, to a large extent, due to an acid intoxication produced by the anæsthesia, his worst case occurring after a light nitrous oxide gas and oxygen supplemented by only ½ oz. of ether.

Of our 28 cases of nitrous-oxide gas and oxygen, 3 vomited once each, while the others had no nausea or vomiting whatever. In practically every case the narcosis was supplemented by ether at the start to obtain the desired degree of relaxation. With few exceptions, these were short anæsthesias varying from fifteen to thirty minutes.

There were in our series 10 post-anæsthetic pneumonias, of which 4 followed the intrapharyngeal method, 4 the ether rebreathing method, 1 after drop ether, followed by intrapharyngeal insufflation, and 1 after simple

drop ether. Three cases developed on the first day after operation, the other 7 on the third day. Two cases could be definitely explained by exposure; 3 cases had tubercle bacilli in the sputum, and had rales preceding the anæsthesia. Another case had a previous slight bronchitis, and was subjected to a long, severe operation; and 1 case operated upon for acute intestinal obstruction was believed to have aspirated some of the stomach contents as it came up around the tube during gastric lavage. The other 4 cases could not be explained except as having aspirated ether-laden mucus, or vomitus. Three cases died on the second day after the pneumonia developed, and 1 case of tuberculosis died later in the medical ward. Of the remaining 6 cases, 5 made a complete recovery and 1 still showed dulness to percussion and distant breath sounds at the time of discharge three weeks later.

Eight cases developed an acute bronchitis lasting from five days to a week. Three followed pharyngeal insufflation; 3 the intratracheal, 1 of whom had definite rales before operation; 1 after ether rebreathing; and 1 after the closed cone. Of these 8, 2 had a previous chronic bronchitis, and the third had an acute pharyngitis. One case was suspected of having tuberculosis, and 1 was a case of goitre, who had secreted considerable mucus and vomited three times following operation. One case showed no physical signs, but complained of pain in the chest and coughed for several days. The remaining 2 cases could not be explained.

There were 2 deaths during narcosis, 1 of which was unquestionably the result of the anæsthesia, death being due to asphyxia during the induction period, in a case of extensive cellulitis of the neck, accompanied by a slight

edema of the larynx. The other case was a child with a lung abscess, who, during the early stage of the narcosis, coughed up a large quantity of purulent material, aspirated it immediately, and could not be revived by a prolonged intratracheal insufflation of air.

Eight per cent of the cases who had ether showed a slight irritation of the kidneys, but in 2 per cent of these there was a pre-existing nephritis. In the majority of cases the casts disappeared after the first day, and the urine became normal. In one case casts and albumin were still present at the time of discharge twelve days later.

The blood pressure was accurately determined in a number of cases by means of a Bowle's stethoscope strapped over the brachial artery at the bend of the elbow and a Tycos sphygmomanometer applied to the arm just above the elbow. By the use of 3 or 4 feet of heavy rubber tubing attached to the stethoscope and sphygmomanometer the anæsthetist could sit at the head of the operating-table and record the blood pressure throughout the course of the anæsthesia. Our observations led to the conclusion that, as a rule, ether causes a rise of about 5 or 10 mm. during the stage of excitement, then a drop to normal in full surgical anæsthesia, and then, after the first hour or so, a gradual fall in pressure. One case, however, showed no fall after two and a half hours of intrapharyngeal insufflation, the operation being a rather difficult dissection of the cervical lymph nodes.

Below is printed the chart (see Fig. VIII) which we have been using for our anæsthesia records, showing the course of a typical case of intrapharyngeal insufflation

L.S. Booth.

THE ROOSEVELT HOSPITAL ANAESTHESIA CHART.

Div. II.

Ward III — Date of operation 4-1-14

Name H.W. — Age 27 — Occupation Domestic — Nativity Irish

Habits: Tobacco *Neg. Mod. Exc.* — Alcohol *Neg. Mod. Exc.* — Drugs — Exercise

Nutrition *Thin Average Fat*

Condition *Weak Average Strong*

Heart Negative

Lungs Negative — Kidneys Negative — Arteries Negative

Previous anaesthetics. What? When? How taken? None

Operator Dr. Connell — Operation Glands of Neck

Administration of anaesthetic: Started 10:28 — Stopped 1:13

Operation: Started 10:45 — Stopped 1:20

System used Pharyngeal — Sequence Gas and Ether

Quantity: Ether — Induction — oz. — Continuance — oz.

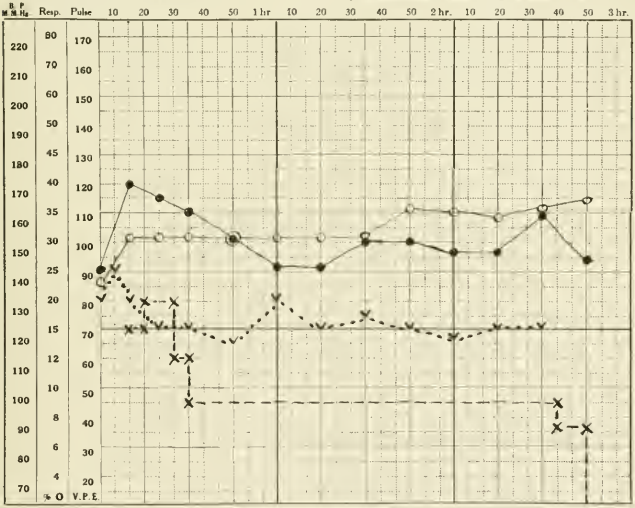
Nitrous oxide — " — gals. — " — gals.

Chloroform — " — drams. — " — oz.

Adjuvants 0 — Supporting Measures 0

Symptons during Narcosis: Cyanosis Slight on Gas — Jactitation 0 — Heart action Good

Mucus Moderate amount — Rigidity 0 — Respiration Regular and deep — Vomiting 0 — Cough 0



SUBSEQUENT HISTORY — Conciousness regained? A M — P. M. 3:15 — Vomiting: how many times? 2 — when ceased? 6 P.M.

Pneumonia? 0 — Bronchitis? 0 — Back ache? Slight — Other complications?

Remarks:

Anaesthetist STREET

FIG. VIII.

with the tracings of pulse, respirations, blood pressure, and ether percentage. This chart has proved to be very satisfactory and, while at first glance it appears complicated, is simple enough when one becomes accustomed to its use. Duplicate records are made out and, with the patient's chart, are sent back to the ward where the subsequent history is added. One of these records is then filed with the patient's history chart, and the other is kept as a separate anæsthesia report which we hope to have bound and kept as a permanent hospital record.

NOTE.—This report covers the period of eleven months during which the anæsthesia of the Division has been under the supervision of a paid anæsthetist.

CASES OF ECTOPIC PREGNANCY AT THE ROOSEVELT HOSPITAL

JANUARY 1, 1909, TO DECEMBER 31, 1914

BY HOWARD C. TAYLOR
ATTENDING GYNECOLOGIST

On the gynecological service of The Roosevelt Hospital during the five years from January 1, 1910, to December 31, 1914, there were 46 cases diagnosed as ectopic pregnancy:

Ruptured	33
Unruptured	13
Total	46

Of these 46 cases, 44 cases were married and 2 cases were unmarried.

INDICATIONS FOR OPERATION.—If a case of ectopic pregnancy is admitted to The Roosevelt Hospital and it is believed that there is active bleeding in the abdomen, the patient is, ordinarily, operated on at once. There are some cases of ectopic pregnancy that are in such extreme condition that they will not survive the additional shock of an operation, and with these it is better to delay. Cases of this class, in the writer's judgment, are not frequent, and no such case occurred in the present series.

The bad condition of a patient suffering from an ectopic pregnancy with intra-abdominal hemorrhage is

due to two causes. One is the loss of blood from the hemorrhage, the other is the increased intra-abdominal pressure due to the presence of the blood in the peritoneal cavity. When the abdomen of a case of this kind is opened the blood is ejected with considerable force, and the general condition of the patient quickly improves. If the condition of the patient were due to the loss of blood alone it would not improve so quickly, after the intra-abdominal pressure had been lessened by the removal of the greater part of the free blood. In the series there were 6 cases that were operated upon immediately after entering the hospital.

If there is no active bleeding at the time of admission to the hospital, that is, if the case is unruptured or is a pelvic hæmatocele, operation is delayed until the general and local conditions seem to be favorable for operative interference.

The general condition of these cases is usually good, the temperature was usually about normal, and the average pulse about 95, in our series.

It is often impossible to distinguish an unruptured ectopic pregnancy from a pyosalpinx or a pelvic hæmatocele from a pelvic abscess. In fact many cases of ectopic pregnancy are diagnosed only after the abdomen is opened at the operation. If there is no active bleeding, and the case is under proper observation, there is no risk in delaying for a reasonable time operation for an ectopic pregnancy. While we believe that some cases of ectopic pregnancy would get well without any operation, and that probably many cases recover without either a diagnosis or even a suspicion of ectopic pregnancy, we believe that all cases of ectopic pregnancy should be

operated upon as soon as a diagnosis is made and the general condition of the patient warrants it.

With inflammatory diseases of the tubes and ovaries the conditions are different. If an operation is performed too early, there is an increased risk to the patient and important organs may have to be sacrificed. It is therefore best to delay operation in these cases, if the condition of the patient will permit, until the acute exacerbation has subsided.

In the doubtful cases, therefore, that is, the cases in which a certain diagnosis between ectopic pregnancy and inflammatory disease of the appendages cannot be made, it is best to delay the operation.

It will be noticed, in the table, that the average delay or period of observation was 4.5 days for the ruptured and 3.9 days for the unruptured cases. Also that the longest delay for the ruptured cases was nineteen days and for the unruptured sixteen days.

Average number of days spent in the hospital:

Ruptured	21.7 days
Unruptured	21 days

Period of observation (admission to operation):

RUPTURED

Longest	19 days
Shortest	Immediately
Average	4.5 days

UNRUPTURED

Longest	16 days
Shortest	1 day
Average	3.9 days

Duration of time from rupture to operation:	
Longest	35 days
Shortest	3 hours

Sterility.—The relation between the ectopic and previous pregnancies is shown in the following table:

Number of cases where there were *previous pregnancies:*	
Children only	20
Miscarriages only	9
Both	13
None	4

It is usually accepted that an ectopic pregnancy frequently follows a period of sterility. This point was confirmed by the cases in this series. In 11 cases, or 25 per cent, of those who were married there had been a period of at least five years just previous to the ectopic pregnancy, during which the patient had not been pregnant. The longest period was twenty years.

Inflammatory Condition.—The same is true of inflammation of the appendages. It is generally believed that inflammation of the fallopian tubes, by narrowing the lumen and in this way preventing the passage of the impregnated ovum to the uterus, is an important etiological factor in ectopic pregnancy.

Of 44 cases in this series, 76 per cent gave a history of inflammation of the appendages, or it was discovered at the time of the operation.

Menstruation.—In 81 per cent of the cases there was a history of irregularity in the menstrual bleeding. In 8.7 per cent there was a history of amenorrhœa lasting to the time of operation.

Pain.—In 69.6 per cent of the cases of ruptured ectopic pregnancies, the classical symptoms of acute

localized sharp pain, with nausea, vomiting, and fainting, were present. Of the unruptured cases, 92.3 per cent complained of pain on the side of the diseased tube.

Breasts.—The breasts were enlarged and tender in 44 per cent of the cases and in 55 per cent they showed no change.

Blood Examinations.—In an unruptured ectopic pregnancy there is no reason to expect any change in either the red or white blood-cell count, excepting from excessive menorrhagia. As there is no bleeding in such cases there should be no change in the red-blood-cell count due directly to the ectopic pregnancy. The white-blood count may be moderately increased from peritoneal irritation, but the increase should be slight.

In the unruptured cases in the series, the average number of white blood-cells was 8,670, with 73+ per cent polynuclear cells and 25+ per cent lymphocytes.

In cases of ruptured ectopic pregnancy there are several factors which influence both the red and the white cell counts. These factors are the amount and suddenness of the hemorrhage, the time that has elapsed between the hemorrhage and the blood examination, and, finally, the presence or absence of infection.

If the bleeding is slow, such as may occur from uterine bleeding continuing over a long period, or from a number of moderate hemorrhages from the ruptured tube, or from the slow continuous bleeding that sometimes occurs from the end of the tube, then there is a marked diminution in the red blood-cells and in the percentage of hemoglobin; and there may be a slight increase in the white blood-cells, as is seen in secondary anæmia.

If there has been a sudden and profuse hemorrhage,

in addition to the change in the red-cell count and in the hemoglobin percentages, there is a marked increase in the total number of white cells and also in the percentage of polynuclear cells. The extent of this change depends on the amount of the hemorrhage and the time that has elapsed since it occurred. In the present series the highest total white count was 24,000 with 88 per cent polynuclear cells. In a case of ectopic pregnancy at The Roosevelt Hospital, which occurred previous to the period covered by the present series, the total white-cell count was 46,000 and 95 per cent were polynuclear cells. If such a case is examined a few days later both the total and polynuclear count will be less.

In the present series of cases of ruptured ectopic pregnancies, excluding the infected cases, the average white blood count was 14,430, and 83.7 per cent polynuclear cells.

If an ectopic pregnancy becomes infected the white-cell count depends on the extent of the infection. It follows closely that of a pelvic abscess.

Operation.—The indications for operation have already been given. The abdomen may be opened for ectopic pregnancy either through the vagina or through the anterior abdominal wall.

Vaginal Route.—There are three indications for opening the abdomen through the posterior vaginal wall for an ectopic pregnancy: (1) for diagnosis; (2) for small pelvic hæmatocele; (3) for septic infection of the pelvic hæmatocele.

For diagnosis, an opening in the posterior vaginal wall is of great value. There are some cases in which the diagnosis between an acute salpingitis and a ruptured

ectopic pregnancy is difficult. In these cases, as the patient is in the dorsal position for cleansing and the ether examination, an incision in the posterior fornix requires but a moment of time. If the case proves to be a ruptured ectopic pregnancy, the colpotomy wound can be left for possible drainage and the abdomen opened above the pubes with practically no loss of time and no injury to the patient. If the case proves to be an acute salpingitis, the peritoneal cavity has not been opened, nor the parts handled in a way that is associated with special risk to the patient. The posterior colpotomy wound may even be of value for drainage in such a case.

At The Roosevelt Hospital a posterior colpotomy is frequently used to establish the diagnosis of ruptured ectopic pregnancy before the abdomen is opened through the anterior abdominal wall.

A small pelvic hæmatocele can properly be treated by a posterior vaginal incision. If the hæmatocele is small, it can be largely enucleated through the vagina, the cavity packed lightly with gauze, and the case cured more quickly and safely than if the abdomen is opened above the pubes. If the hæmatocele is large, it is not possible to remove all the blood-clots, and the cavity is nearly sure to become infected before it is healed. This increases the risk and the duration of the convalescence. In cases of large hæmatoceles it is therefore the custom at The Roosevelt Hospital to open through the anterior abdominal wall, and to remove the blood-clot more completely than can be done through the vagina.

If sepsis is present in the hæmatocele, that is, if it has been converted into a true pelvic abscess, or if the

blood-clot has become fluid, then a vaginal incision and drainage without opening the abdomen is the safer and the proper treatment.

The abdominal route is used for all unruptured tubal pregnancies and all the ruptured cases that are not included under the indications for selecting the vaginal route.

When the abdomen is opened the ruptured tube is removed, if the opposite tube is present and in condition to perform its function. If the opposite tube is not in such a condition, the ruptured tube is resected. Occasionally an unruptured tube is incised, the gestation products enucleated, and the tube resutured. In a few cases of tubal abortion no operation on the tube is necessary.

The following table gives the frequency of the different operations on the cases in the present series:

Posterior colpotomy only:	
Ruptured	2 (6.0 per cent)
Unruptured	0
Abdominal only:	
Ruptured	20 (60.6 per cent)
Unruptured	12 (92.3 per cent)
Abdominal and colpotomy:	
Ruptured	11 (33.3 per cent)
Unruptured	1 (7.7 per cent)

Mortality.—In the series there were 4 deaths or a mortality rate of 8.7 per cent. Two of the deaths were cases that had advanced beyond the fifth month. One died from shock and hemorrhage and the other from septicæmia.

Subsequent Pregnancies.—Of the series, excluding the cases that died, and those in which the operation precluded pregnancy, there were 14 cases whose history in regard to subsequent pregnancies was obtained. Of these 14 cases, 3 had subsequent intra-uterine pregnancies. One case had three children, another two children, and the third had a miscarriage.

In addition to these cases of intra-uterine pregnancy, there were 4 cases, or 8.7 per cent, that had subsequent extra-uterine pregnancies.

PHYSIOLOGICAL AND PATHOLOGICAL CHANGES IN THE ENDOMETRIUM

By JOHN W. WARNER, M.D.
ASSISTANT GYNECOLOGIST, THE ROOSEVELT HOSPITAL

There are many variations in the histological pictures of uterine curettings, some of which are normal and some pathological. It is well understood that during normal menstrual activity there are definite progressive and retrogressive changes; in fact, there are constant physiological variations. These may be seen alone or may be encountered in company with pathological conditions, and the natural and morbid states may be confused. It is not infrequent that the true physiological changes may simulate or approach those of a real inflammatory state.

The interrelation of physiological and pathological states of the endometrium has long been a subject of discussion. Many gynecologists and pathologists have held that true endometritis is extremely rare. They have endeavored to formulate general terms to embrace the various natural changes which approach the pathological. Such terms are the "chronic congestive edema" used by the older writers and the "hyperplastic endometrium" in use at present. Recently John G. Clark has drawn attention to the physiological variations occurring during menstruation and has emphasized the importance of considering the time of curettage when making a microscopical diagnosis of chronic endometritis.

There are changes which occur in the endometrium analogous to those of inflammation, but which are not abnormal when appearing in the peculiar and characteristic structure of the uterine mucous membrane. For instance, a moderate degree of glandular change or increase is not pathological, nor are glands distorted by the pressure of a surrounding congestion indicative of inflammation. During the pre-menstrual stage, during actual menstruation, and for several days after its cessation, scattered round cells may be found in the stroma. Unless associated with other manifestations, the presence of a few discrete round cells is not a basis for the diagnosis of inflammation. Shortly before and during menstruation the finding of leucocytes in moderate number is not abnormal. At this time a stream of blood components passes from the vessels into the stroma. Finally, subsequent to pregnancy there are alterations in the uterine mucous membrane which are not of inflammatory nature.

True endometritis must be constituted by a combination of changes in definite degree. It is doubtful whether it is so rare as some would have us believe, especially when it is remembered that the interior of the uterus is frequently invaded by pathogenic organisms, particularly the gonococcus. However frequent true endometritis may be, it is interesting to note that in a series of cases examined without reference to the menstrual cycle, mistakes may occur. It is not proposed here to discuss the histology of endometritis. We have simply taken from the records a number of cases and studied the laboratory specimens and case histories in conjunction. The figures obtained show that a proportion of cases clinically considered as chronic endometritis do

not appear as such when microscopically examined and, also, that a laboratory diagnosis may be made of chronic endometritis in cases not truly inflammatory where the curettings were removed near the time of menstrual activity. In the cases used here the pathologist did not know the stage in the menstrual cycle at which the material was obtained. It is a custom in many large hospitals to send curettings and other material to the pathologist with a good history of the case, but with no record of the time of curettage relative to menstruation. Such information is important to the pathologist chiefly to further the perfection of diagnosis in his records. There is no question of malignancy and no harm is done by mistakes, but a more careful history would materially aid in a better understanding of the pathology of the endometrium, which is still not well known.

Only recently it became a routine procedure at The Roosevelt Hospital to state, in the history rendered to the pathologist, the time relative to menstruation when the uterine scrapings were removed. Knowing the periodicity of the patient, it is a simple matter to calculate the relation very closely. This is then entered in the history as . . . days pre- or post-menstrual, or as in the resting stage.

In an active service, where the majority of cases are curetted and the specimens subjected to routine examination, there are, of course, many cases of true endometritis. The cases here considered have been selected from a great number as best illustrating the subject under discussion; namely, the confusion of normal specimens, removed near the time of menstruation, with those of true pathological nature. The specimens studied were

obtained within the limits of ten days before or after menstruation, the majority being much nearer the actual time. All the patients were under forty years of age, and the operations were for more or less simple conditions. No inflammatory cases are included. Twenty-five cases were studied which had been curetted at the resting-stage. These and all the others were reported as chronic endometritis, chronic hyperplastic endometritis, glandular hyperplasia, and by other kindred terms. All were clinically considered as endometritis.

After careful study of the specimens with reference to the case histories and special attention to the menstrual chart, we have revised some of these diagnoses. Of the 127 cases studied, 88 per cent were found to show the lesions of true inflammation. Sixteen cases (12 per cent) are found to be not truly inflammatory. This number is not large, but is sufficient to show how the changes incident to menstruation may be confused with those of inflammatory conditions.

Of the cases curetted at the resting-stage all show the lesions of true chronic endometritis. Here the histological changes are not associated with those of menstrual variation and there is no percentage of error even though the pathologist was in ignorance of the time of curettage. It is significant that when the examiner is not confused with the alterations incident to menstruation, he can give a surer diagnosis.

In the 16 cases considered non-inflammatory, we would prefer the term "essentially normal endometrium." True normal endometrium is rarely if ever seen. All of them show a varying degree of glandular change and, in a few, there is some tortuosity of the glands. In a number (curetted very near the time of menstruation)

the glands are somewhat broken down and mucoid material is occasionally seen in the acini. In several specimens leucocytes in small numbers are found in the stroma. Edema and extravasation of red blood-cells are commonly seen.

The chief indications for curettage in these cases were the history of leucorrhœa or a change in the character and amount of the menstruation. In some cases there were both indications. These are, undoubtedly, symptoms and they usually evidence a pathological condition. But, in dealing with a structure like the endometrium, it is difficult to fix the border-line at which physiological manifestations become truly pathological. It is not uncommon to see a patient whose menstruation is of longer duration or more profuse than the ordinary and to find this endometrium to be essentially normal. Nor is a certain degree of secretion abnormal, as is proved by the frequency of pre-menstrual and post-menstrual leucorrhœa. Finally, the history in regard to leucorrhœa is not always reliable. A discharge may have its origin in the mucous membrane of the uterus, cervix, or vagina. The corporeal membrane may be normal when there is a discharge from an old lacerated cervix.

These statements are borne out to some extent in the statistics of our cases. Leucorrhœa occurred in 87 per cent of those found to be truly inflammatory. It also occurred in the other cases, but 7 of the 12 had lacerations of the cervix or pelvic floor, and it can be fairly assumed that the discharge did not emanate from the cavity of the uterus.

Increase in duration or amount of menstruation occurs in 60 per cent of the inflammatory cases and in 12 per cent of those curetted near the time of menstrua-

tion and found to be non-inflammatory. Here is a wide difference and it shows that a change in the character of menstruation is typical of true chronic endometritis. In the non-inflammatory cases the menstrual variation was not marked.

Of the cases in which no inflammation was present, 4 had retroversion, a percentage of 25. In these specimens the change nearest approaching inflammation was a certain degree of edema. More or less obstructive edema is usually present in cases with displacement, and it is here that the so-called "chronic congestive endometritis" occurs. Edema is a salient feature of the inflammatory reaction, but obstructive edema is not necessarily so. The edema attending displacements is most frequently associated with true inflammation, but, occurring alone as an obstructive edema, it is not genuinely inflammatory. The condition may fairly be termed "chronic congestive edema" rather than a variety of true inflammation.

In this series of cases revision of diagnosis is made in but a small number, which, as stated, were curetted very near the menstrual period. Yet these few will help to show that proper recognition of the menstrual cycle will aid to more correct diagnosis. No question of malignancy is involved and the treatment is practically the same whatever may be the diagnosis. In fact, except in case of malignancy, the treatment is largely completed before the laboratory diagnosis is received. But more attention to the menstrual variations will further the advance of knowledge in the relationship between the natural and morbid conditions in the endometrium, of which there is still much to be learned.

FRESH AIR IN THE TREATMENT OF CERTAIN MEDICAL DISEASES OF CHILDREN AT ROOSEVELT HOSPITAL

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The Medical Pediatric Division of Roosevelt Hospital consists now of a ward of eight beds, a quarantine ward of four beds, and a roof, partly covered by a shed on the north, east and west sides, with seven beds, and a maximum capacity by endowment of only fourteen beds. They are all on the same floor and adjacent to each other, an arrangement that lends itself well to fresh-air treatment. The result of keeping children in this open roof shed during cold weather has seemed so interesting and so remarkable that a brief review of some of the cases kept there is presented in the following pages.

It has long been an accepted fact among certain specialists in diseases of children that exposure to fresh, cold, moving, out-of-door air stimulates the circulation, puts color in the cheeks, increases the vigor of the body, the appetite, and the assimilation of food. While this has been applied particularly to children sick with a very limited range of illness, especially pneumonia and tuberculosis, equally good results are derived from the use of this out-of-door fresh-air treatment in bronchitis, anæmia, chorea, marasmus, and measles, as well as in all children lacking in vigor but with no tangible disease.

Ten years ago a good deal was written concerning

this out-of-door treatment of hospital cases, particularly by Doctor Northrup, and, while the results obtained continued satisfactory, this fresh air treatment has gradually fallen into disuse. Moreover, the method of treatment has usually not been very thorough. Children would be kept out of doors a certain number of hours each day, but rarely were they kept out of doors all the time.

The exact action of this fresh air on the body functions was never explained in a manner that seemed rational until Doctors Howland and Hoobler published the results of a series of experiments on children with pneumonia and tuberculosis at Bellevue Hospital, when they reported that they found a marked increase in blood pressure from putting the children out of doors and an equal diminution in blood pressure when the children were returned to the closed wards of the hospital. This seemed so rational an explanation that it was generally accepted and hardly seemed to need confirmation, but although several years have elapsed no confirmation of these results has been published, so far as I know.

In work done under the writer's supervision at the New York Foundling Hospital, and at the New York Nursery and Child's Hospital by Doctor Schloss, no corroboration of these results could be obtained, while at Roosevelt Hospital Doctor Hartshorn has carried out a considerable series of blood-pressure experiments with no constant results. We are thus unable to confirm the results of Doctors Howland and Hoobler.

While some children have shown a considerable increase in blood pressure on being put out of doors, others have shown no increase, while, on the other hand, there

has been no constant fall of blood pressure noted on returning the children to the ward. In fact we find that the blood pressure is, on the average, no higher out of doors than in the ward.

An advantage of out-of-door treatment is the marked lessening of communicability. We have had cases of measles develop on our roof, which were followed by no subsequent cases evidently due to these cases. This is an experience almost never met with in hospital wards.

Our bedsteads are white enamel, which is not injured by dampness or wet, and are thus well adapted for this purpose. Ample bed-clothes are provided for use in cold weather, as well as sufficient appliances, such as hot-water bags or heaters, to keep the extremities warm. Mitts may be needed on the hands, while in very cold weather a cap for the head is desirable. The children are kept on the roof, not for a few hours each fine day, but day and night during all weather. Care is taken, particularly by feeling the feet, to see that the children are comfortably warm; they are brought into the wards only to change, bathe or dress them.

The conditions which have seemed in our service to be most benefited by this fresh-air treatment are pneumonia, tuberculosis, anæmia, chorea, marasmus, and convalescents from any disease. Kidney and heart cases we have thought best to keep in the wards, although one child that had nearly died with endocarditis and pericarditis seemed during convalescence to have been much improved by living on the roof in winter, and this was allowed at his request and was apparently much enjoyed by him.

I wish particularly to emphasize the fact that our

wards are kept cool and well ventilated so that any comparison between the ward and the roof is a comparison between a fairly open ward and a roof shed.

The one disease that is most generally accepted as benefited by fresh-air treatment is pneumonia, and of cases of pneumonia we have had a considerable number.

The method of treating these cases in our wards has been to give them an initial dose of castor oil, put them in beds on the roof, keep their extremities warm and their bowels open. Very few of the cases have received any stimulant or any expectorant. In some cases where the cough was troublesome a dilute solution of tincture of chloride of iron in glycerine or water has been used.

Before considering our results of treatment of these cases of pneumonia it will be of advantage to arrive at some idea of the mortality of pneumonia in children. Doctor Holt gives a mortality of 5 per cent for lobar pneumonia, but for broncho-pneumonia in private practise from 10 to 20 per cent; in uncomplicated broncho-pneumonia in institution children of 50 per cent, and in complicated pneumonia of from 80 to 100 per cent; while classifying them by age he gives as the mortality of 346 cases during the first year 66 per cent; second year, 55 per cent; third year, 33 per cent; and fourth year, 16 per cent. The mortality of the last 42 cases of lobar pneumonia at the New York Nursery and Child's Hospital, where conditions are very good, was 19 per cent, while that of the last 221 cases of broncho-pneumonia was 33 per cent.

Of the last 82 cases of pneumonia treated in the Medical Pediatric service at Roosevelt Hospital 12 have died. In order, however, to secure a more accurate mortality figure a certain number of cases should be taken

from this list. Six cases were transferred on account of the following complications:

Two cases having diphtheria bacilli in the throat cultures; 3 cases with vaginitis; 1 case with scarlatina.

Others were taken home by their parents while acutely ill—in all 15 cases. There are 4 other cases that should likewise be deducted, 1 that died five hours after admission, 1 that died six hours after admission, and 2 that came in with terminal pneumonia. This corrected list leaves us with 66 cases and 8 deaths, giving a mortality of this corrected list of 12 per cent, which you will see compares well with Doctor Holt's mortality for private patients, and is markedly below his institution children.

The differential diagnosis between a broncho-pneumonia and a lobar pneumonia in infancy is often difficult clinically and even at autopsy by gross examination alone, so that I am in the habit of considering all cases of pneumonia in infancy as broncho-pneumonia unless they give the clinical symptoms and physical signs of a pneumo-coccus lobar pneumonia, that is, a persistent high temperature ending by crisis with the physical signs showing a lobar distribution of the lesion.

Our cases have been classified as broncho and lobar pneumonia. Considering now our uncomplicated cases we had 27 cases of broncho-pneumonia that ran an average fever for seven days after admission, in which class there was 1 death, a child of 9 months. Of lobar pneumonia there were 14 cases, the temperature averaging normal three days after admission. One of these cases died, a baby of 6 months. Grouping these together we have 41 cases of uncomplicated pneumonia with 2 deaths, or a mortality of less than 5 per cent.

These cases were left to nature's cure and our mortality is very low.

One case of particular interest was a colored boy, 5 years old, who came into the hospital with typhoid fever. He ran the ordinary four weeks' fever, followed by a relapse of two weeks, at the end of which time, after having been in the ward eight weeks, he developed pneumonia and was immediately put on the roof. The pneumonia involved first the right upper, then the left lower and the right middle lobe. The breathing was very bronchial on the right side, and soon we found developing on our X-ray plates two cavities in the right middle lobe. These became larger, the sputum became foul, and physical signs of these cavities developed. The boy was desperately sick for a long time, but was finally discharged eighteen weeks after admission with a practically normal temperature. He has since made a good recovery, and has been at school during the past winter. This boy would, I believe, have certainly died if he had not been put on the roof.

Recently he has been returned to our ward with signs of consolidation over the right middle lobe, with an X-ray plate that shows the presence of the old cavities with consolidation in the neighborhood and areas that are fairly typical of tuberculosis. He was running a moderate temperature with marked remissions and was vomiting on admission. During the days he has been on the roof his temperature has become more moderate, he has stopped vomiting, his appetite has improved, and his last X-ray picture shows a marked clearing of the areas of consolidation in his lungs.

Perhaps our most interesting result in the roof treatment has been in the cases of abnormal conditions of

CHART No. 1.

TEMPERATURE AND RESULTS OF BLOOD EXAMINATIONS IN A CASE OF SECONDARY ANEMIA.
Red lines represent normal.

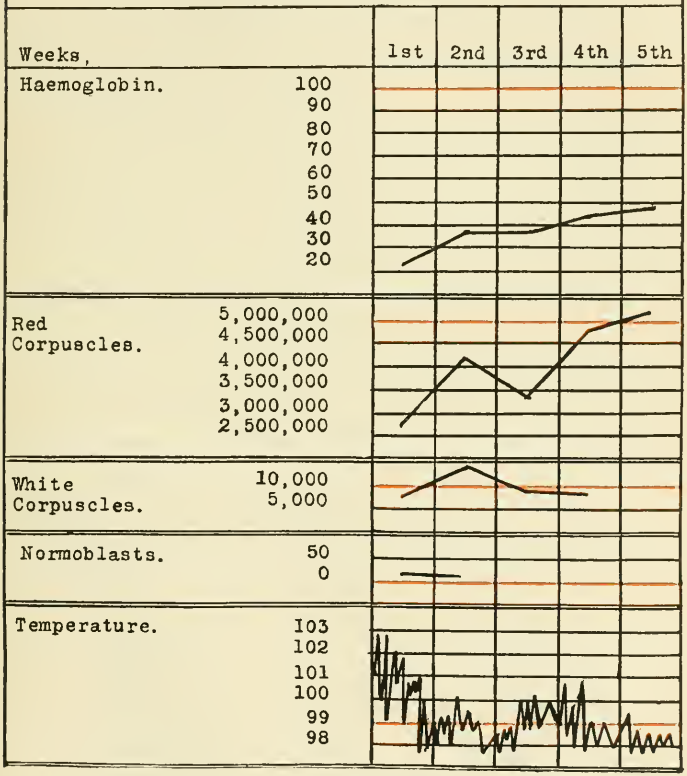

FIG. IX.

the blood. One simple anæmia made a wonderfully speedy recovery.

A poorly nourished child of 13 months came to our service running a considerable temperature from 101 to 103° with bronchitis, gastro-enteritis, and a marked simple anæmia. The hæmoglobin was only 22 per cent, red cells 2,840,000, white cells 7,700. There was moderate poikilocytosis and anisocytosis.

This child was given seven drops of the syrup of the iodide of iron three times daily in addition to the treatment on the roof. The improvement was very rapid, the temperature in a week having reached normal, while in four weeks from admission the hæmoglobin was 45 per cent and the red cells 5,030,000. The weight had increased 1 pound. The respirations had fallen from 38 to 28. The pulse had fallen from 136 to 100.

The rapid improvement of this child is well shown on the accompanying Chart (Fig. IX).

A very marked case of Von Jaksch's anæmia occurred in a colored child, a Porto Rican, 3 years old. The child complained of fever and headache, had a large spleen, and ran a temperature of 102° for ten days after admission. She was put on the roof and was given no medicine excepting such as was necessary to keep her bowels open. Her blood count on admission was:

Hæmoglobin	17.5%
Red blood cells	1,368,000
Index	0.77
White blood cells	41,000
Polynuclears	74%
Lymphocytes	26%
Megaloblasts	10
Anisocytosis and poikilocytosis	....

showing a markedly typical Von Jaksch's anæmia condition. Eight days later the blood had improved as shown on the chart: the next week showing still further improvement, the normoblasts and megaloblasts having nearly disappeared, while on the 29th of April the child was so well that she was discharged, the spleen, however, remaining large.

Six weeks later the child returned with pneumonia, the blood, however, being much the same as when the child was discharged, showing none of the conditions of Von Jaksch's type of anæmia. The child made a recovery on the roof from pneumonia and was not seen again until last January, when she came in with the following blood count:

Hæmoglobin	25%
Red blood cells	1,600,000
Index	1.1
White blood cells	60,000
Polynuclears	70%
Lymphocytes	27%
Myelocytes	3%
Normoblasts	48
Megaloblasts	18
Anisocytosis and Poikilocytosis	....
Red blood cells:	
Largest	12.6 m.
Smallest	2.1 m.

The spleen remained about the same size. Normoblasts and megaloblasts were present in considerable numbers, and there was a considerable increase in the number of white cells, and a diminution in the red cells.

One week on the roof almost eliminated the normo-

blasts and megaloblasts, and brought the white cells down to normal. At that time it occurred to me that the improvement in the child's condition might not be due to the roof treatment but might be due simply to hospital care. Therefore, on the 15th of January the child was put in the ward. The temperature immediately began to rise and, although we had contemplated leaving the child in the ward for a week, on the sixth day the child was doing so badly it was felt that it was not fair to leave her there any longer and she was taken to the balcony. At that time the blood had changed as follows:

Hæmoglobin	33%
Red blood cells	1,600,000
Index	1.2
White blood cells	17,400
Polynuclears	60%
Lymphocytes	32%
Myelocytes	8%
Megaloblasts	4

After a week on the balcony there was a marked improvement in the blood count as indicated below:

Hæmoglobin	36%
Red blood cells	2,400,000
Index	0.9
White blood cells	14,400
Polynuclears	56%
Lymphocytes	36%
Myelocytes	0
Normoblasts	2
Megaloblasts	1

while the child's temperature returned to normal.

At this time, unfortunately, she showed gonococci in a vaginal smear and had to be transferred.

The accompanying Chart (Fig. x) shows well the approach to normal of the abnormal condition of the blood as well as the lowering of the temperature while on the roof, the return toward the original condition on admission during the six days in the ward, and the subsequent improvement on the roof.

A third case, one of leukemia, was 4 years old, of French and German parentage, and gave a history of cough for four months, swelling of the neck for four weeks, dyspnœa, constipation, pains in legs and arms, anorexia, and fever for a few days. He had had dysentery when 6 months old. His complexion had always been yellow.

Physical examination showed a fairly well-developed, poorly nourished boy with skin so dark as to suggest mulatto blood. He was evidently anæmic and looked sick. There was slight dyspnœa with inspiratory stridor and slight cough. The tongue was moist and clear. The teeth were decayed. There was a general enlargement of the lymph glands all over the body. The parotid and submaxillary glands were markedly enlarged but not tender, while large masses of lymph nodes filled the neck. Large groups of lymph nodes were in both axillæ, extending out over the anterior chest wall. The epitrochlears were felt, and the inguinal glands were markedly enlarged. The chest showed a diminished excursion on the left side. There was on the same side some dulness with, however, a rather tympanitic note over the scapula. There were a few moist rales on this side with diminished breathing of a somewhat bronchial type. The abdomen was large, showing a markedly

TEMPERATURE AND RESULTS OF BLOOD EXAMINATIONS IN A CASE OF VON JAKSCH'S ANEMIA.

R. G. Freeman.

Chart No.2.

Blue lines represent time in Ward. Red lines represent normal.

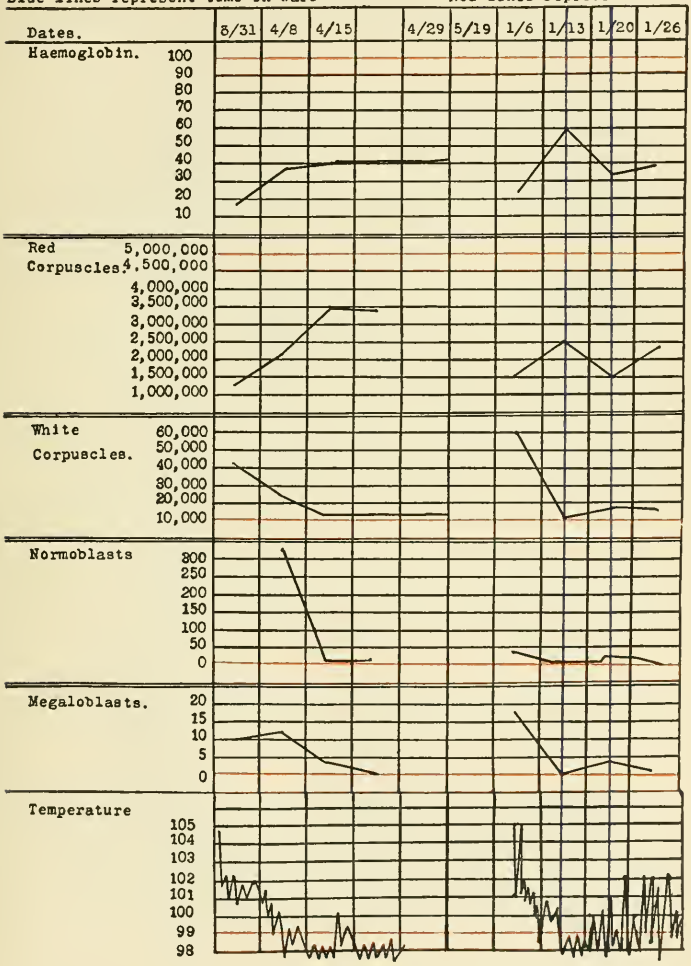

FIG. X.

enlarged liver and spleen as indicated in Chart (Fig. xi), the spleen extending 7½ in. below the free border of

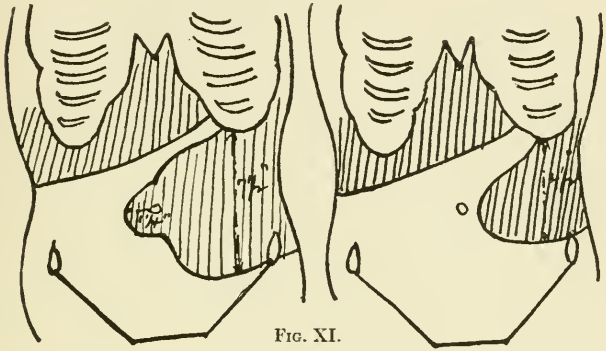

Fig. XI.

the ribs in the mammary line, and 1¼ in. to the right of the mid-line at the navel.

The blood count showed:

Hæmoglobin	30%
Red blood cells	2,000,000
White blood cells	158,400
Neutrophiles	2%
Basophiles	1%
Small lymphocytes	5%
Large lymphocytes	90%
Türik irritation	2%
Anisocytosis and poikilocytosis	....

The X-ray plate showed a consolidation of practically all of the left lung, while an exploratory puncture of the left chest withdrew a few drops of turbid amber fluid.

This child was placed on the roof where, as may be seen by Chart (Fig. xii), the white blood cells dropped in

twenty-four hours from 158,400 to 15,000. The general appearance improved and the child began to get color in his cheeks. Each X-ray plate showed further clearing up of the pneumonia and physical examination showed a diminution in the size of the spleen. So that on the thirteenth day after admission all the lymph nodes as well as the salivary glands having diminished in size, the spleen having contracted from 7½ to 4½ in. below the free border of the ribs and no longer coming forward to the median line, a considerable portion of pneumonia having cleared up as shown by the X-rays, and the blood having a normal number of leucocytes and being improved in other respects, the child was put in the ward. In this ward, during a considerable part of the time that the child was in it, the windows at both ends were open and it was always well ventilated.

At the end of four days in the ward the lymph nodes were as large as they were on admission. The spleen had again extended beyond the median line, and to 7½ in. below the free border of the ribs. The leucocytes, which had been daily increasing, had reached again 90,000, so that it seemed unfair to keep the child longer under these conditions and he was again removed to the roof.

Summary

Treatment of children in an open-air shed in winter increases their vitality and resistance to disease more powerfully than medicines.

Cases of pneumonia run a short course and show a very low mortality. Certain abnormal conditions of the blood rapidly improve with little or no medical treatment.

CHART No. 3.

TEMPERATURE AND RESULTS OF BLOOD EXAMINATIONS IN A CASE OF LEUKEMIA.
R. C. Freeman

Red Lines represent normal. Blue lines represent period in Ward.

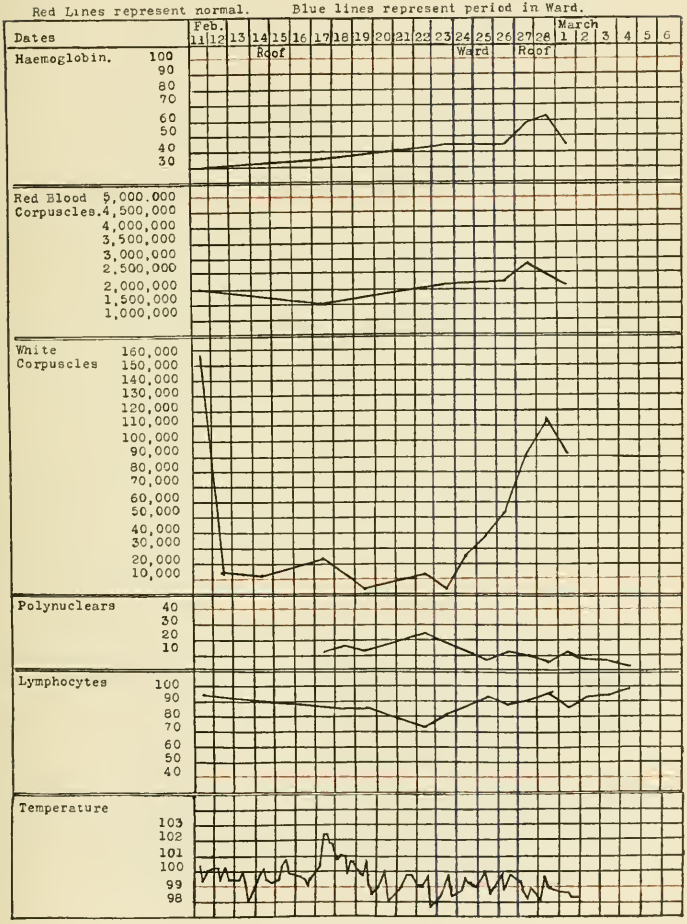

FIG. XII.

A CASE OF INCREASED INTRAVENTRICULAR PRESSURE

With Unusual Pressure Symptoms

By PHILIP VAN INGEN, M.D.
JUNIOR ATTENDING PHYSICIAN, CHILDREN'S SERVICE, THE ROOSEVELT HOSPITAL

The following case is reported on account of the interesting and unusual signs of intracranial pressure:

K. N., aged 5 years. Admitted to Bliss Ward September 6, 1913. Family history is negative—no evidence of tuberculosis in any member of the family.

Personal History.—She was one of twins, born at term. Labor difficult, and forceps were used. Breast-fed for three months, and then given bottle. Nothing of any importance in her history until onset of present illness. Has always been a strong, healthy child, and never been acutely ill before.

Present Illness.—Four months before admission, while apparently in perfect health, she began to complain of pain in the back of her neck, and at these times the mother noticed she would hold her head stiffly with chin somewhat elevated. After about half an hour pain and rigidity would disappear, and the child would seem perfectly well and play about as usual. These attacks continued to recur for a period of two months, at shorter and shorter intervals. There were no other symptoms noticed by the mother. No fever. No loss of weight or appetite. No change in disposition.

Two months ago the index finger of the left hand was noticed to be held in a position of extension. This quite rapidly became more marked, and soon the other fingers of the left hand became stiff and slightly extended. After a few days the stiffness of the

neck, which had occurred intermittently up to this time, became more marked, the pain more intense, and she took to her bed. After a few days the legs became stiff, the knee flexed, and the child was unable to stand. At about the same time the whole left arm, forearm, and hand became rigid, and use of the left arm was lost. The mother was unable to give the exact dates when the various symptoms began to appear, but was sure of their order. During the six to seven weeks before admission, during which time she was confined to her bed, the course was apparently as follows: The index finger of left hand became gradually more and more extended. The other fingers semiflexed and rigid. The left knee flexed, stiff, and paralyzed. The left foot stiff, great toe extended, other toes semiflexed. The neck constantly stiff and slightly retracted. (See Figs. XIII and XIV.) She complained of constant pain in neck, especially on motion. Drowsiness, gradually increasing to semi-stupor, gradually developed. The mother suddenly noticed, about four weeks before admission, that the child seemed blind.

During the entire period she has taken her food well from a spoon. Bowels have been regular and movements not involuntary. Urination is involuntary. She has lost much weight. Of late night cries have been frequent, sharp, and piercing.

Physical examination on admission, September 6, showed a poorly nourished, pale child. When not disturbed she lay quietly, respiration was regular, not rapid, no cyanosis. When disturbed she would cry out. Did not seem to understand when spoken to.

Pupils were equal, slightly dilated, and reacted only sluggishly to light. Child was apparently totally blind.

Examination of the fundus showed tortuous vessels, a few hemorrhages, and double optic atrophy.

Neck stiff and slight retraction of the head—movement caused a sharp cry.

Mouth, pharynx, and ears negative.

Lymph Nodes.—Right inguinal slightly enlarged.

Heart.—Apex impulse in fourth space, 2 in. to left of midsternal line. Sounds are loud—booming and regular—no murmurs—basal sounds strong and sharp.

Pulse regular and good force—normal rate.

FIG. XIII. Case of increased intraventricular pressure.

FIG. XIV. Case of increased intraventricular pressure.

Lungs.—A few scattered subcrepitant and occasional coarse rales over both chests, especially posteriorly—no change in voice or breathing.

Abdomen.—Sunken—soft—no masses felt.

Liver and spleen not made out.

Extremities.—Left arm held close to body with forearm flexed, and quite rigid.

Left index finger in marked hyperextension—rigid—other fingers semiflexed and slightly rigid.

Left thigh flexed, adducted—rigid; leg flexed on thigh; foot inverted, with marked extension of great toe. Other toes stiff. Proximal phalanges flexed—distal extended.

Right arm and leg show no evidence of paralysis or spasticity.

Reflexes.—Knee jerks exaggerated. Marked Kernig on left side —none on right.

Spine.—Held moderately stiff—examination unsatisfactory. There does not seem to be any change in sensation.

Von Pirquet Reaction.—Very strongly positive.

Blood.—Hæmoglobin, 64 per cent.

Leucocytes, 19,200, of which 82 per cent polymorphonuclear, 13 per cent large mononuclear, 5 per cent small mononuclear.

Wassermann negative.

Lumbar Puncture.—Twenty cubic centimeters clear—not under increased pressure. Fluid contained 11 cells per centimeter. No reduction of Fehlings solution. Wassermann negative. No tubercle bacilli found.

Course in the Hospital

The child remained in the hospital from September 6 to November 1, 1913, when she died. For most of the time there was very little change in the picture noted on admission. She never seemed to understand anything that was said to her. She was quiet most of the time, although occasionally she would cry out "stop that" or "mamma." "Night cries" were present at times.

There was little change in the contractures. The

left index finger remained constantly in hyperextension, as did the left great toe. The flexion of the left knee and adduction of the foot were not so marked toward the end.

She continued to take her food, usually very well, up to the day before she died. Her bowels moved every day without difficulty and stools were of good character.

Lumbar puncture was performed eight times. The cell content of the fluid varied from 3 to 11 per cm. The amount obtained never exceeded 20 c.c. and was never under distinctly increased pressure. Tubercle bacilli could never be found, and guinea-pig inoculation was negative, the animal killed three months later showing no evidence of tuberculosis.

The blood picture varied slightly. The total leucocytes were between 5,700 and 19,500, falling gradually toward the end, the polymorphonuclears varying between 51 and 82 per cent.

The urine contained at times a few casts and a trace of albumen.

The temperature ran an irregular course, as may be seen from the chart. (Figs. XVA to XVE.)

On October 31 the pulse was noticed to be slightly irregular and of poor quality. The next morning the stupor had become more marked and the child refused food. About noon she became cyanotic and respirations became very slow, shallow, and irregular, ceasing entirely after an hour.

Unfortunately an autopsy could not be obtained.

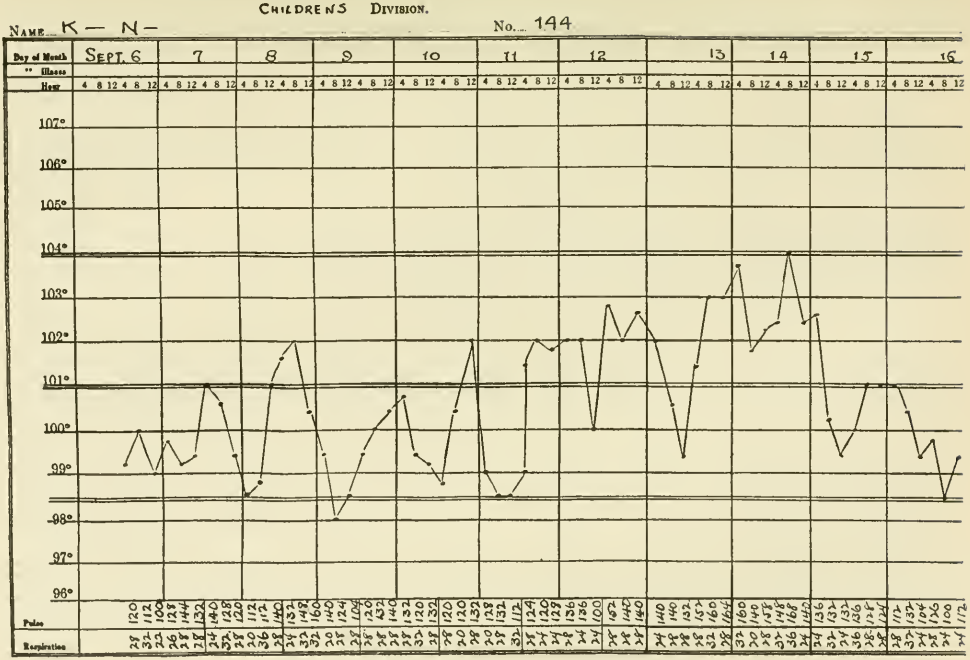

FIG. XVA. Case of increased intraventricular pressure.

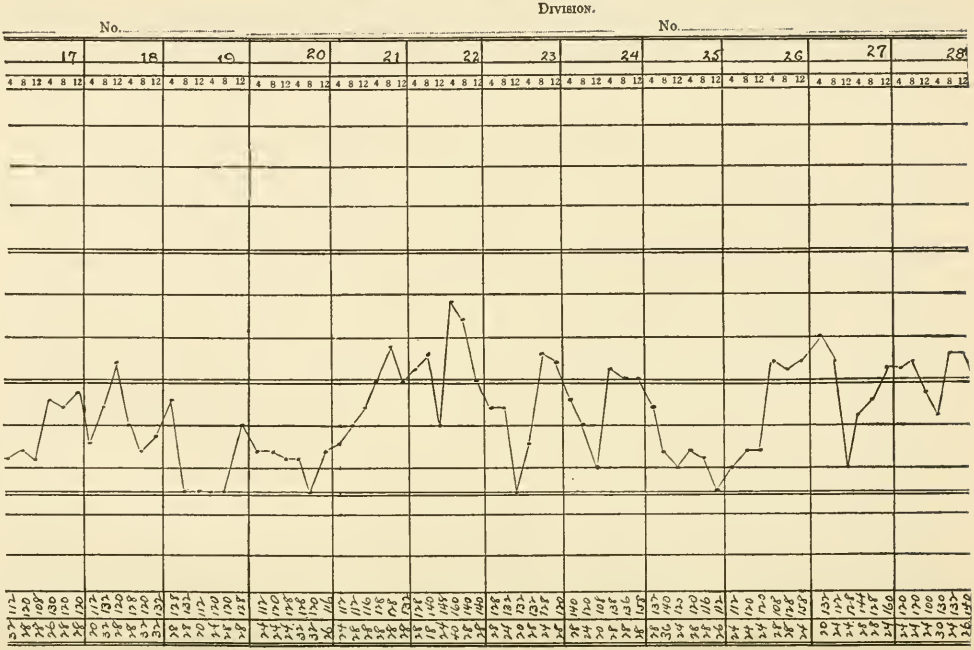

FIG. XVB. Case of increased intraventricular pressure.

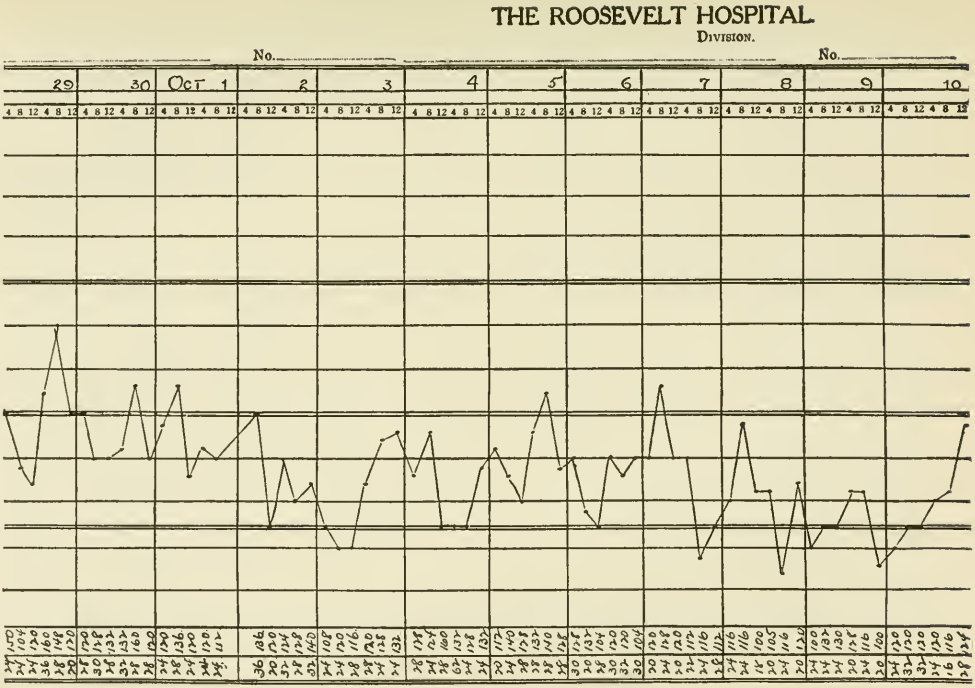

FIG. XVc. Case of increased intraventricular pressure.

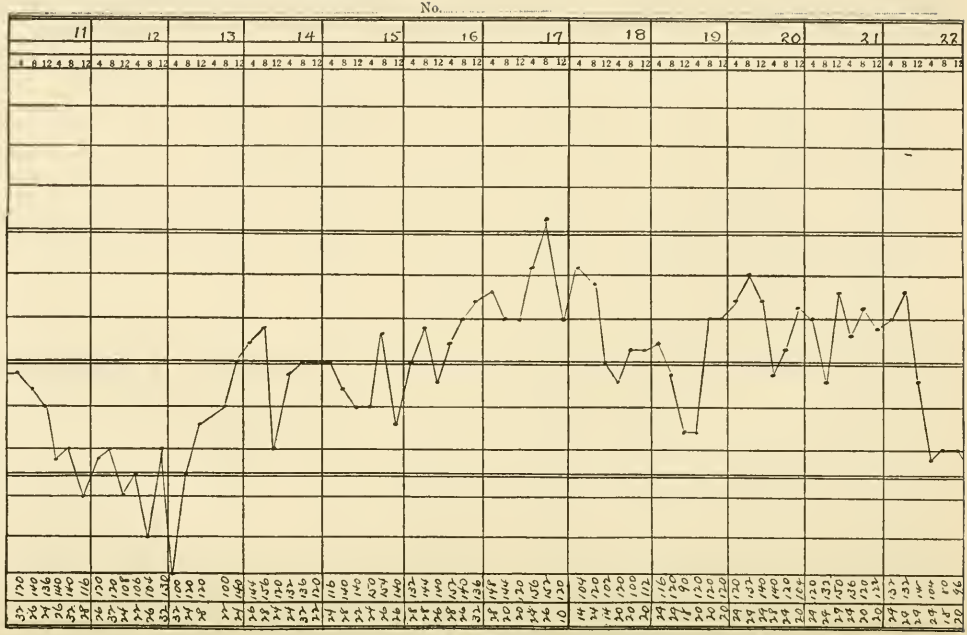

FIG. XVD. Case of increased intraventricular pressure.

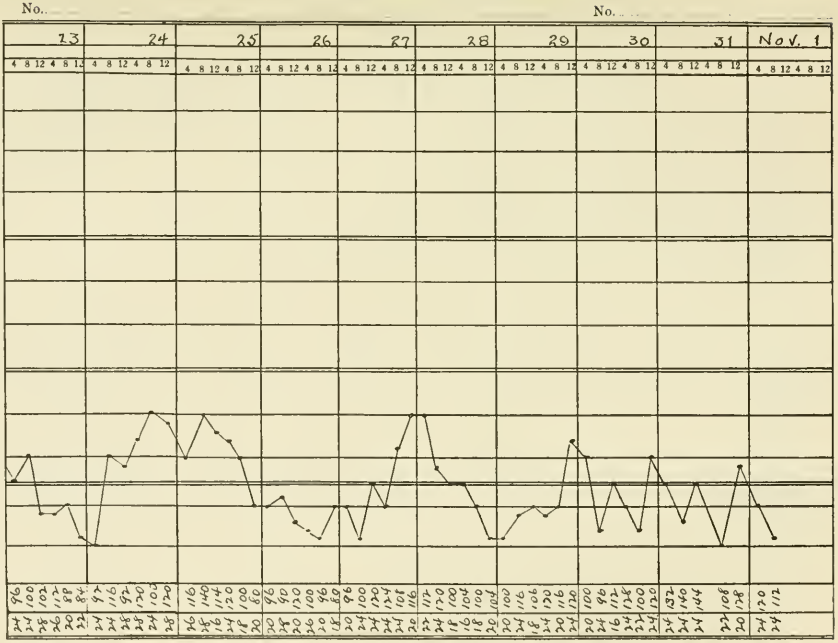

FIG. XVe. Case of increased intraventricular pressure.

THE ROENTGEN RAY IN THE DIAGNOSIS OF PULMONARY CONDITIONS IN CHILDREN

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Although the importance of the Roentgen ray in the diagnosis of pulmonary tuberculosis has for some time been recognized, it is only within the last year that the possibilities of its use in the diagnosis of other pulmonary conditions have been developed. Pneumonias, showing few physical signs due to their location and to the slight amount of lung tissue involved, serous and purulent exudates, abscess of the lung, hyperplasia of bronchial lymph nodes, pneumothorax, as well as miliary tuberculosis, are now visibly demonstrated where formerly their existence was largely a matter of conjecture.

In the children's service at The Roosevelt Hospital, roentgenograms are taken of all pneumonias, not only in obscure cases for diagnosis, but also to determine associated conditions and the extent of active processes.

The cases reported illustrate the value of its aid in these various conditions.

The first roentgenogram * (Fig. XVI) shows a practically normal chest. The slight shadow at the right and left of the heart is called the hylus shadow and is due to the branching of the bronchi and vessels at the root of the lungs. In some cases the mediastinal glands are distinctly pictured.

* Illustrations grouped at end of article.

In pneumonia the shadow in the lung tissue is produced by the congestion and hepatization there present. Many of these conditions are better shown in the negative than in the prints.

Case 1. Pneumonia.—Phillip O'D. Age 10 years. Admitted August 6; discharged August 20, 1913. Family and past history negative.

Present Illness: Four days ago complained of headache, referred to the frontal region, pain in the epigastrium and in the lower right chest, worse upon inspiration. Has had cough and bloody expectoration. Vomited five or six times, bowels have been loose, anorexia.

Examination of the Lungs.—Good respiratory excursion, respiratory murmur is accentuated over the right lower chest anteriorly. No adventitious sounds heard. Upon admission, temp. 101, resp. 28, pulse 140. Temperature that night rose to 104 with slight remissions for three days when it fell by crisis to normal.

Blood Examination.

	Aug. 6	Aug. 8
W. B. C.	40,000	27,400
P.	94	87
L.	6	8
Hg.	95	....

August 8. Still has harsh and sibilant breathing over right anterior chest but no definite signs of pneumonia. Roentgenogram (Fig. XVII) shows partial consolidation of the upper right lobe, with extensive involvement of the middle lobe.

August 10. Physical signs show typical bronchial voice and breathing over the right upper and middle lobes.

The house physician reports that this case was first seen by the surgeons because of the severity of the abdominal pain which radiated to the right lower quadrant. The diagnosis rested between an acute catarrhal appendicitis and a developing pneumonia. The patient was

finally referred to the medical service and was of unusual interest as the physical signs did not correspond with the clinical severity of the attack.

It was several days after the picture had shown an involvement of the right upper and middle lobes that the signs corresponded with a lesion of such extent.

Case 2. Pneumonia.—Harold W. Age 7 months. Admitted July 21; discharged July 31, 1913. Family history negative.

Present Illness.—Breast-fed for six months, then given milk and barley water. Four days ago began to cough and soon developed a high fever. Had one convulsion lasting twenty minutes, very dyspnœic. Another convulsion upon the day of admission. Marked rachitis.

Examination of the Lungs.—Over the left posterior chest dulness with many coarse rales. On both sides friction rubs are heard. Temperature upon admission 102, rising to 104, and ranging between 100 and 103 for three days, falling to normal upon the fifth day. Resp. 36 to 80. Pulse 130 to 160.

Blood Examination.

W. B. C.	13,100
P.	40
M.	9
Hg.	60

Lumbar Puncture.—Fluid not under pressure.

W. B. C.	30 to cm.
P.	65
L.	33
M.	2

Roentgenogram (Fig. xviii) three days after admission showed a pneumonia involving the upper right and left lobes, extending to the right middle lobe.

When first seen this patient appeared to be suffering from some severe form of cerebral irritation. The child's

head was thrown back, the respirations were exceedingly rapid, 60 to 80 most of the time. Physical signs did not indicate the pneumonic areas involved and a meningeal condition was suspected. Lumbar puncture did not confirm this possibility.

A roentgenogram showed distinctly a developing pneumonia, the signs of which soon appeared.

Case 3. Pneumonia.—Woodford. Age 15 months. Admitted July 28; discharged August 18, 1913. Family history: father died of tuberculosis.

Present Illness.—Breast-fed for seven months, then given modified milk and light diet. Three days ago the patient developed fever accompanied by a slight cough. For two days past the child has refused to lie upon the right side. No history of chill. Examination of the lungs: Anteriorly on the right side there is dulness from the supraclavicular space to the base, with bronchial voice and breathing down to the fourth rib. Left side of chest is clear. Temp. 102, rising to 104.4 in the afternoon. Resp. 80. Pulse 72. Temperature fell gradually to 100 with slight evening exacerbation. Patient developed a double otitis media and left the hospital against advice.

Two days after admission the roentgenogram (Fig. XIX) showed a pneumonia involving nearly all the right side.

The extent of the pneumonia is clearly shown. The physical signs at the time the picture was taken were very definite.

Case 4. Miliary Tuberculosis.—James S. Age 10 months. Admitted October 14; died October 15, 1913. Family history negative.

Present Illness.—Patient has been under observation in the O. P. D. for over one month, brought first because of a swelling upon

the left side of the neck and also suffering from an enteritis. At this time the examination of the lungs showed many coarse rales widely distributed. The cervical adenitis responded very slowly to treatment and the child lost weight rapidly. Baby was taken to the country but failed to improve.

He was admitted to the hospital with a temperature of 100. Resp. 56. Pulse 156.

Examination of the Lungs.—Chest normal contour, no rosary present, respiration somewhat limited over the right side and labored. Over the whole of the right chest are heard many mucous rales. There is dulness and marked increase in the voice and breathing in the axilla extending upward over the middle and upper lobes. Behind there are showers of large moist rales over the entire chest, more concentrated at the apices. Temperature rose that evening to 102.8, falling in the morning to 98.

Blood Examination.

W. B. C.	10,700
P.	75
L.	11
M.	4
Hg.	48

The roentgenogram (Fig. xx) showed both lungs studded with miliary tubercles. After death the peritoneal glands were easily palpable.

Case 5. Miliary Tuberculosis.—Philip M. Age 2 years. Admitted July 19; discharged July 31, 1913. Family history negative.

Present Illness.—One month ago had measles followed by chickenpox, which lasted for two weeks, when he developed a high fever and a cough. Has had no night sweats, but has lost considerable weight.

Examination of the Lungs.—In front many fine and coarse rales are heard over the entire chest. Behind there is dulness upon both sides, extending down as far as the spine of the scapula. Over the

entire posterior chest are heard many fine rales. There is no change in the voice and breathing. Temperature ranged from 101 to 104 in the evenings. Resp. 60 to 70. Pulse 160 to 180.

Blood Examination.

W. B. C.	21,900	
P.	54	
L.	30	
M.	15	
E.	1	Von Pirquet positive.
Hg.	78	

Roentgenogram showed many small areas apparently miliary tuberculosis over both chests. (Fig. XXI.)

Condition unimproved at discharge.

It was thought upon admission that the child might be suffering from a diffuse broncho-pneumonia. The general course of the disease with the physical signs and the roentgenogram pointed clearly to a pulmonary, and probably a general miliary tuberculosis.

CASE 6. BRONCHO-PNEUMONIA, WITH SEROUS EXUDATE.—Alexander M. Age 10 months. Admitted September 24; discharged October 28, 1913.

Family History.—Mother is in the hospital at present with lobar pneumonia. Mother and child were admitted upon the same day.

Present Illness.—Three days ago child was taken to a dispensary where a diagnosis of bronchitis was made. Chief complaint has been cough accompanied by high fever.

Examination of the Lungs.—Slight dulness of the right base behind. Temperature ranged from 100 to 104 in the afternoons for four days, when it fell to normal. Resp. 28 to 60.

Roentgenogram (Fig. XXII) showed a broncho-pneumonia with exudate involving the right side. A week later there was a reinfection with marked dulness and

diminished breathing at the right base, causing a temperature which ranged from 98.8 to 105 for four days. Complicating this was a double otitis media and a general furunculosis which gradually subsided.

Blood Examination.

	Sept. 30	Oct. 2
W. C. B.	35,400	34,500
P.	71	78
L.	23	13
M.	6	9
Hg.	52	....

This picture shows very well the obliteration of the costolphrenic angle upon the right side, indicating the presence of exudate. No free fluid was found upon aspiration of the chest. The physical signs gradually disappeared, so it was concluded that the exudate had been absorbed. The child was discharged in good condition.

Case 7. Abscess of the Lung.—Daniel D. Age 2 years. Admitted October 29; discharged December 31, 1913. Past history negative.

Present Illness.—Four months ago had pertussis followed one month later by a pneumonia complicated by a hydrothorax. This was treated by medicine and the condition was reported improved, although patient still suffered from occasional attacks of fever. Cough has been progressively worse. Child was taken to the O. P. D. where a diagnosis of empyema was made.

Examination of the Lungs.—Entire left chest, front and back, flat upon percussion, absence of breath sounds.

Blood Examination.

	Oct. 30	Nov. 21
W. B. C.	17,000	38,000
P.	72	76

Thoracotomy.—No pus found in the pleural cavity, drainage tube left in situ. Three days later profuse discharge which continued for twenty-four days. Patient discharged on sixty-third day, wound closed. Normal breath sounds and resonance. Temperature for the first week ranged between 101 in the mornings to 103–104 in the afternoons, falling to 101 in the third week with slight exacerbations, and reaching normal in the fourth week.

This picture (Fig. xxiii) also shows the obliteration of the costo-phrenic angle upon the left side. The diagnosis of empyema was made from the general physical signs and from the condition of the child. Although no pus was found at the time of the operation it was felt certain that the lung was infected, and consequently the wound was left open with drainage. The result showed that this conclusion was correct.

Case 8. Abscess of the Lung.—Mary U. Age 6 years. Admitted July 10; discharged August 18, 1913.

Past History.—Has had convulsions, measles, scarlet fever, pertussis.

Present Illness.—Three weeks ago tonsils and adenoids were removed. Following the operation there developed a high fever accompanied by a severe cough which was often relieved by vomiting. The vomitus was brownish-yellow with a foul odor, and accompanied by a putrid expectoration. Mother thinks that the child has lost about 6 pounds in weight during the last ten days. For the past week patient has complained of severe pain in the left chest. At night there has been high fever.

Examination of the Lungs.—In the left axilla and extending from the angle of the scapula to the base there is dulness, absence of fremitus, voice, and breathing. Temperature upon admission was 102.8. Pulse 140. Resp. 56. For the first three days the tem-

perature ranged from 102 in the morning to 103 in the evening. It then fell to 101 with slight morning remissions for four days, after which it gradually became normal. The cough, which was very severe, occurred in paroxysms and was generally accompanied by foul-smelling vomitus or expectoration. After the cough cavernous breathing could often be heard over an area about the size of a dollar just below the spine of the scapula.

Blood Examination.

W. B. C.	20,800
P.	78
M.	5
E.	1
Hg.	74

Sputum Examination.—Muco-purulent, few pus cells, few bacteria, no T. B.

Roentgenograms.—(1) July 12: Distinct shadow extending from the middle of the left chest to the base. There is a darkened area near the top of the shadow. (Fig. xxiv.)

(2) Taken July 22: Condition about the same, physical signs about the same. Area about the size of a dollar well defined. (Fig. xxv.)

(3) Taken July 31: Area is smaller and less distinct. The signs in the chest have nearly disappeared. There is a very slight cough and the patient has gained about 1 pound in weight. (Fig. xxvi.)

October 23.—Patient has been very well since leaving the hospital and has gained 6 pounds in weight. Has very little cough or expectoration. Still has cavernous breathing at times just below the spine of the left scapula.

Supplementary Case

Case 9. Pyopneumothorax.—Through the courtesy of Doctor John Thacher the following case is reported from the adult medical service:

M. P. Female, age 40 years. Admitted November 21, 1912; discharged January 22, 1913.

Chief Complaint.—Shortness of breath for the past seventeen days.

Present Illness.—For the past seventeen days patient has suffered from shortness of breath, pain in the chest accompanied by a severe cough. Two days ago the pain became more intense, especially upon the left side, and the dyspnœa increased.

Examination of the Lungs.—Marked bulging and immobility of the entire left chest. R. C. 17⅛ in.; L. C. 17½ in. No expansion upon the left side. On this side fremitus is present over the root of the bronchi in front and behind, elsewhere absent. Hyper-resonant tympanitic note is heard upon percussion over the upper left chest in front and behind, with dulness and flatness below. Breathing is distant and diminished with a slightly amphoric quality in the first space and in the supraclavicular triangle. Elsewhere it is completely absent. Occasional rale is heard. At the angle of the scapula voice has an exaggerated nasal quality, below this it is markedly diminished. Hippocratic succussion is present.

Right chest shows dulness at the right apex in front and behind with broncho-vesicular voice and breathing. Fremitus is increased and a few subcrepitant rales are heard at the right base in the axilla and posteriorly.

Heart.—Entire heart is markedly displaced to the right, apex beat is neither seen nor felt. Upon percussion the area of cardiac dulness extends 2¾ in. to the right of the mid-sternal line in the fourth space. Maximum area of pulsation just below the ensiform cartilage, sounds are heard loudest over the ensiform. Action is regular, moderately rapid. Sounds are distant but of fair quality. No accentuations or murmurs are heard.

Upon admission, temp. 101.8, pulse 108, resp. 88. Patient very dyspnœic, cyanotic, pulse of poor quality. Temperature ranged

from 101.6 to 104 with morning remissions. Resp. 38 to 88. Pulse 108 to 130. Upon the second paracentesis, two days after admission, 450 cc. of purulent exudate were withdrawn.

Blood Examination.

	Nov. 22	Nov. 23
R. B. C.....	5,000,000	....
W. B. C.....	14,800	22,200
P.....	76	76
L.....	24	24
Hg.....	45	....

Red cells pale, anisocytosis and poikilocytosis.

Patient was referred to the surgical service where she was operated upon and a partial ostectomy of the eighth rib was performed. Patient was discharged cured January 22, 1913.

ROENTGENOGRAMS.—(1) This shows very well the sacculated area of exudate with air above it. A thick band of adhesions apparently extends upward over the pocket. There is involvement of the lungs upon both sides. (Fig. XXVII.)

(2) This picture is taken with the patient upon her side and shows the change in the position of the air and exudate. (Fig. XXVIII.)

(3) In this picture the sinus leading to the pocket is injected with bismuth. (Fig. XXIX.)

CONCLUSIONS

The Roentgen ray is of distinct value in the diagnosis of diseases of the respiratory tract. In pneumonia a shadow may appear over the suspected area several days before the development of definite physical signs.

It is of value in determining the progress of lung

involvement. Roentgenograms may be taken upon successive days as long as there are signs of active advancement of the process.

The Roentgen ray offers material assistance in the differential diagnosis of tuberculosis, abscess of the lung, lobar and broncho-pneumonia.

Through the obliteration of the costo-phrenic angle, the Roentgen ray indicates the presence of an exudate.

I wish to express my thanks to Doctor Freeman for permission to report the cases from the Bliss Ward, to Doctor Thacher and to Doctor Sumner for their courtesy in allowing me to use the medical histories, and to Doctor Leaming, the radiologist of the hospital, for the excellent photographs and for suggestions regarding their interpretation.

Fig. XVI. Normal lungs.

Fig. XVII. Pneumonia of upper lobe, right lung. Case 1.

FIG. XVIII. Pneumonia of upper lobes, both lungs. Case 2.

Fig. XIX. Pneumonia of right lung. Case 3.

Fig. XX. Miliary tuberculosis of both lungs. Case 4.

Fig. XXI. Miliary tuberculosis of both lungs. Case 5.

FIG. XXII. Pneumonia of right lung with serous exudate. Case 6.

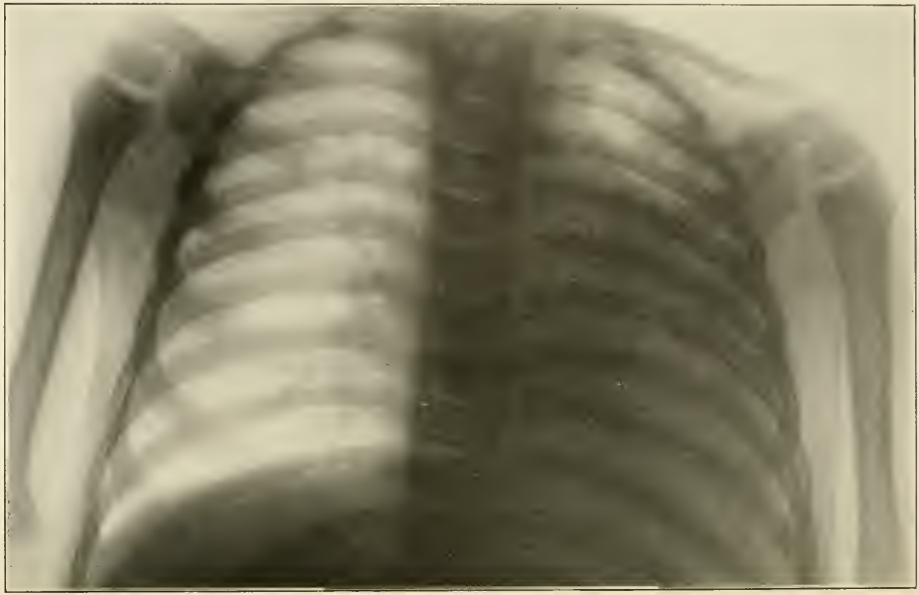

Fig. XXIII. Abscess of left lung. Case 7.

Fig. XXIV. Abscess of left lung. Case 8. I.

Fig. XXV. Abscess of left lung. Case 8. II.

Fig. XXVI. Abscess of left lung. Case 8. III.

Fig. XXVII. Left pyopneumothorax. Case 9. I.

Fig. XXVIII. Left pyopneumothorax. Case 9. II.

Fig. XXIX. Left pyopneumothorax. Case 9. III.

ANEURYSM OF THE THORACIC AORTA

A Report of Forty-Five Cases Treated in The Roosevelt Hospital

By DAVENPORT WEST, M.D.,
ASSISTANT VISITING PHYSICIAN, THE ROOSEVELT HOSPITAL

Forty-five cases of aneurysm of the thoracic aorta have been recorded during the last five years—1910 to 1915. Only 7 of these patients were women; 38 were men. Twenty-four were born in the United States. Twelve were negroes. The youngest patient was 24 years; the oldest 67. Thirty-three per cent were between the ages of 30 and 40 years, 20 per cent between the forty-eighth and fifty-third year. Manual labor was the occupation of one-third of the cases. Twelve died in the hospital, a death-rate of about 25 per cent.

Eighteen cases gave a positive history of syphilis; 16 gave a positive Wassermann reaction; 11 gave a negative reaction. Seven of those who denied having had syphilis gave a positive reaction.

Situation of Aneurysm.—As accurately as could be ascertained by physical examination, radiograph, and autopsy findings, the ascending, transverse, and descending portions of the thoracic aorta formed the aneurysmal sac in 14 cases. The ascending and transverse portions were involved in 13 cases. In 13 cases the transverse portion alone formed the aneurysm, the ascending portion

formed the aneurysm in 3 cases, the transverse and descending portions in 2 cases.

Last year during Doctor Frank W. Jackson's service 7 patients were given salvarsan with the hope that this might prove a remedy for aneurysmal pain, and to some extent might relieve dyspnœa and cough and reduce the size of the aneurysm.

Two patients received two five-tenths gram (intravenous) administrations of salvarsan, 1 received two six-tenths gram administrations, 2 received one six-tenths gram, 1 received one five-tenths gram, and 1 received one nine-tenths gram administration of salvarsan.

Radiographs were taken before and after this treatment. In not one instance was there any demonstrable change in size of the aneurysm. The patients who received only one administration of salvarsan found no relief from pain, dyspnœa, or cough. The patients who received salvarsan more than once found no relief until after the second administration. In one instance pain, which had been severe, disappeared after the second dose of salvarsan, and had not recurred one month later when patient was discharged. This patient was not seen again. A patient whose chief complaint was dyspnœa was apparently much improved after the second administration of salvarsan. Ten days later he left the hospital and was lost to further observation. Another patient found relief from pain, dyspnœa and cough after the second dose of salvarsan. Cough in this instance was particularly frequent and distressing. These symptoms were absent for one month, and then recurred with marked severity. Three months later this patient suffered a death of apparent suffocation from aneurysmal

compression of the trachea. Autopsy revealed a large aneurysm of ascending, transverse, and descending portions of the thoracic aorta.

Symptoms.—Precordial pain was the chief complaint in 27 cases; persistent pain in 13 cases; pain of sudden onset in 2 cases. Six patients complained of pain in the right shoulder; 6 complained of pain in the left shoulder; 9 complained of pain in the hands; 6 complained of pain in the back. The pain was described as boring in 2 instances, severe and sharp in 28. Six patients said that they had no pain.

Dyspnœa and cough were the most prominent symptoms in 14 cases. Twenty-four patients complained of cough. Cough was described as of a brassy quality in 5 instances. There were 2 cases of paroxysms of suffocative dyspnœa and stridor. Two patients complained only of weakness.

Other prominent symptoms noted were: palpitation of heart in 8 cases; forcible throbbing of heart, 2; vertigo, 4; fainting, 3; nausea, 1; vomiting, 4; hiccough, 1; dysphagia, 3; hematemesis, 1; numbness and tingling of fingers, 8; swelling of arms and wrists, 2; dyspnœa, 32; orthopnœa, 7. The spoken voice was described as hoarse in 7 cases; weakened, 8; muffled, 1.

Physical Signs.—Thirty-four patients were well nourished, 11 poorly nourished, 12 were cyanotic. In 2 cases, marked congestion of veins of neck was noted.

Pulsation of aneurysmal tumor was felt in the suprasternal notch in 9 cases. Pulsation was seen and felt to the right of sternum in 6 cases; to left of sternum in 9 cases; in back in left infrascapular region in 2 cases.

In 1 case there was marked sternal tenderness. Sys-

tolic thrill was present in 5 cases; diastolic thrill in 2 cases. Diastolic shock was noted as being present in 9 cases.

Twenty-seven cases showed enlargement of the heart to the right; 33 cases showed enlargement to the left. Twenty showed enlargement downward. The heart action was described as being poor in 4 cases.

Tracheal tug was present in 17 cases; absent in 11.

The radial pulses were unequal in 17 cases; the right smaller than the left in 5; the left smaller in 12. Thirty-three millimeters Hg was the greatest difference noted in the systolic blood pressure of the radials.

Breath sounds were described as feeble over part of right lung in 9 cases; feeble over left lung in 6. Harsh, stridulous pulmonary sounds were noted in 12 cases.

Eyes.—The pupils of 27 patients were equal; unequal, 18. Right pupil larger than left, 12; left larger, 4. All reacted equally to light and accommodation except in 1 case.

Complications were as follows: mitral stenosis, 1; lobar pneumonia, 1, confirmed by autopsy; chronic pulmonary tuberculosis, 2; pleural effusion of right side, 2; facial erysipelas, 1; cerebral hemorrhage, 1; cerebral syphilis, 1; pernicious anæmia, 1. (Autopsy.)

Cause of Death.—Of the 12 patients who died, the causes of death were: Rupture into pericardium, 1, confirmed by autopsy; lobar pneumonia, 1 (autopsy); edema of lungs, 1 (autopsy); suffocation, 7. A definite cause of death was not found in 2 patients who were in a state of coma when admitted to hospital. The diagnosis of thoracic aneurysm was confirmed by radiograph in 30 cases; by autopsy in 6.

I am indebted to Doctor Evan M. Evans for the following report:

Periodically Varying Atelectasis of Left Lung from Intermittent Occlusion of Left Bronchus by Varying Aneurysmal Pressure

"A negro woman of about 30 years of age was admitted to the hospital with physical signs of a diffuse dilatation of the ascending and transverse arch of the aorta with a sacculation projecting to the right of the sinus of the arch, and also a sacculation to the left of the crossing of the arch. The latter exerted pressure on the left main bronchus and caused periods of extreme atelectasis of the left lung with absence of vesicular respiratory murmur and absence of inspiratory expansion of that half of the chest, and with such extreme percussion dulness as to suggest pleural effusion. During these periods of bronchial occlusion, radiographic examination of the chest revealed diffuse clouding of entire left lung and displacement of heart, mediastinum and aneurysm about 4 cm. to left of the usual position, resulting in displacement of the former systolic pulsation in the first and second interspaces to right of the sternum. With spontaneous release of the left bronchial occlusion, signs of atelectasis in the left lung would quickly disappear, giving rise to normal resonance, normal transmission of respiratory and vocal vibrations, re-expansion of the left lung, disappearance of the radiographic shading, and return of mediastinal contents to their former positions, with likewise a return of systolic pulsation to the right of the sternal margin."

Transverse Division of Sternum for Relief of Dyspnœa

An operation performed by Doctor Charles H. Peck, consisting of partial ostectomy of manubrium, afforded immediate but only temporary relief to a negro patient, aged 34, suffering extreme dyspnœa from aneurysmal tracheal compression.

With local anæsthesia, ½ per cent novocaine, a transverse incision was made at level of second intercostal space, crossing the sternum and extending 2 in. beyond each sternal border. Division of the sternum was completed with a Doyen hand-saw, and a section of the manubrium, ⅛ in. wide, was removed. The sternum sprang apart and the upper portion moved freely with each respiration. Immediately relief followed, but two days later breathing again became difficult. Death ensued from tracheal compression three days after operation.

Brief notes of 4 cases conclude this report.

Case 1.—A negro of 32 years was admitted with signs of obstructive dyspnœa, unconscious and gasping for breath. Respirations were 5 per minute. Radial pulses were not palpable. Heart sounds were not distinctly heard. Artificial respiration was immediately administered with the Ellsberg tracheal insufflation apparatus. After one hour of artificial respiration, patient began to show signs of decided improvement. Ellsberg apparatus was removed, and patient was able to sit in bed and breathe with a certain degree of comfort when leaning forward. Five days later an asphyxia death followed.

Case 2.—A man of 50 years was admitted in a state of marked stupor, with a history of fairly good health until three hours before onset of present illness. "Then everything suddenly became black before his eyes while he was reading the morning paper and he remembered nothing else." There was no history of thoracic pain. Radial pulses were equal, regular, moderately rapid, rather small, tension was noted as being normal, vessel wall not thickened. Dyspnœa gradually became more and more extreme. Death four hours after admission to hospital. Autopsy revealed rupture of aneurysm of arch of aorta into pericardium.

Case 3.—A man of 54 years, a real-estate agent, complained only of weakness eighteen months before admission to the hospital. Three months after onset of weakness he began to notice increasing pallor of skin, slight loss of weight, and cough. He consulted a physician,

who said that "cough was caused by pressure" and advised a radiographic examination of chest. At this time a radiograph taken at St. Luke's Hospital revealed an aneurysm of moderate size of arch of thoracic aorta, not discoverable by physical examination. He was given neo-salvarsan five times without benefit. Then he went to the country for six months, and thought he was improved, but benefit was only temporary, for same symptoms soon returned. Weakness, pallor of skin, and cough brought patient to Roosevelt Hospital. Radiographic examination revealed the same hidden aneurysm, not recognizable by physical signs. A comparison of this radiograph with the one taken fifteen months before showed no change in size of aneurysm.

The Wassermann reaction was double plus, although syphilis was denied. Five blood examinations gave a color index above one and three-tenths; megaloblasts, normoblasts, macrocytes and oval cells were abundant. The last blood-examination showed 800 red cells per cubic millimeter; hæmoglobin, 25 per cent; (Fleischl-Miescher) white cells, 6,000 per cubic millimeter; polynuclear neutrophiles, 60 per cent; lymphocytes, 40 per cent. Feces were negative for ova and parasites. Examination of 3 specimens of gastric contents showed low total acidity, absence of free hydrochloric acid in each instance, absence of blood, and absence of lactic acid.

Laryngeal examination revealed normal vocal cords.

Diagnosis of pernicious anæmia was made, aneurysm was considered of secondary importance. Weakness gradually became more and more marked. Death followed nineteen months after onset of first symptom. Autopsy revealed aneurysm of arch of aorta with much atheroma of thoracic and abdominal aorta. Myeloid hyperplasia of marrow of femur and ribs, osteosclerosis of thyroid cartilage, myocardial degeneration, double adhesive pleuritis, edema of lungs.

Case 4.—A patient of 47 years had complained of precordial pain for six years; one year previous to admission to hospital there was a history of operation for wiring aneurysm. "For eight months after operation there was relief from pain," then pain recurred with marked severity; physical examination revealed a large heart with loud musical systolic and diastolic murmurs heard over precordium. Systolic thrill and diastolic shock were present.

Patient became very dyspnœic, cyanotic, restless, hungry for air. Pulses were rapid and of poor quality. An asphyxia death ensued. Autopsy revealed the large aneurysm seen in the accompanying photographs (Figs. XXX and XXXI). A coil of several feet of silver wire was found free in the aneurysmal sac and ascending portion of the arch.

One strand extended through the arch and was fused to the wall of the descending portion. The greater portion of the wire lay in the ascending portion of the arch. The wall of the sac was extremely thin and lined with a dense deposit of fibrin. Fibrin was abundant on the wall of the sac, but not deposited about the free portion of the wire.

I wish to thank Doctor Jackson for his assistance and for the privilege of reporting these cases.

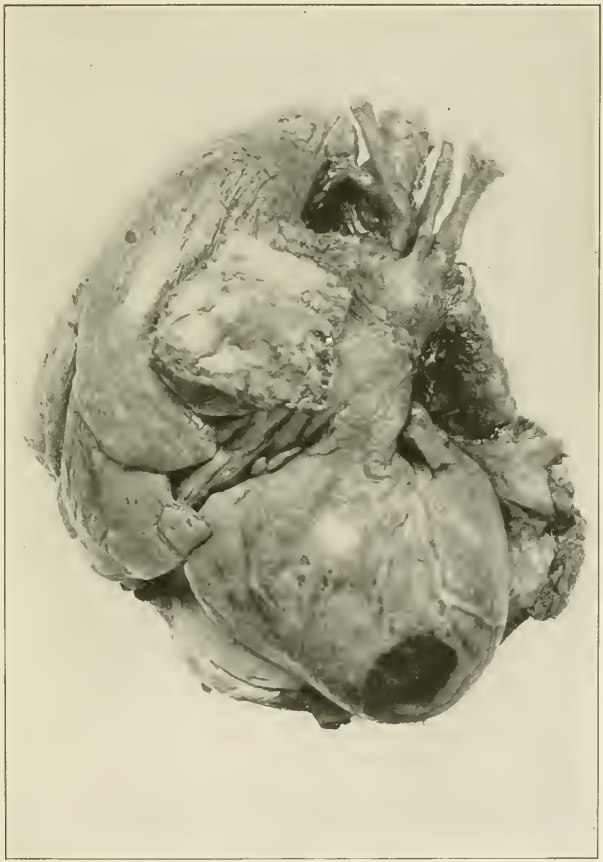

Fig. XXX. Aneurysm of arch of aorta.

Fig. XXXI. Heart and aneurysm opened to show wire.

THE REFLEX EFFECTS OF ALCOHOL ON THE CIRCULATION

By CHARLES C. LIEB, M.D.,
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When concentrated alcohol is taken by mouth it is said to affect the circulation in a twofold manner. One action is purely reflex in nature and is the result of the irritation of the sensory nerve-endings of the mouth and stomach. As a result of this excitation the pulse rate is said to be increased and the blood pressure raised. The second phase of the action occurs after the alcohol has been absorbed; and there is little doubt that after it has been taken up into the blood alcohol does not stimulate the circulation.

It seemed possible that the reflex action of alcohol could be employed clinically in those conditions in which a stimulation of the circulation was called for. It was to determine the nature and duration of this stimulation that the investigation which is here summarized was undertaken.

The patients who were to be studied were guarded as far as possible from those extraneous disturbances which so frequently modify the circulation. Thus, the subjects of the experiments were screened off from the rest of the ward or placed in separate rooms; they were cautioned against changing their positions; the psychic factor was minimized by explaining the general procedure.

The systolic and diastolic blood pressures were taken by the auscultatory method and the pulse was counted for a full minute. The blood pressures and the pulse rate were determined at five-minute intervals until a constant was reached. The alcohol was then administered and the observations were continued at the usual intervals until the circulation approached the normal. The alcohol was administered in the form of whiskey. In order to prevent sufficient alcohol accumulating in the circulation to produce a direct effect on the heart or central nervous system, small doses were usually employed. In the majority of the experiments 5 c.c. or 10 c.c. were administered, though larger doses were also exhibited. Usually undiluted whiskey was employed, though in some instances the whiskey was diluted with from 1 to 4 volumes of water.

In all, 43 observations were made on 21 different patients. These patients were being, or had been, treated for typhoid fever, pneumonia, acute articular rheumatism, malaria, chronic nephritis, cirrhosis of the liver, arteriosclerosis, myocarditis, chronic endocarditis, malignant endocarditis, exophthalmic goitre, hysterical paraplegia, sarcoma of the femur, and diabetes.

An analysis of the protocols of the experiments showed that the patients could be divided into two groups. The first group comprised those who had very active superficial and deep reflexes and who gave a considerable reaction to alcohol. In the second group were those patients whose reflexes were normal or hypoactive and in whom alcohol produced a comparatively slight effect. Thus, the most marked effects on the circulation were seen in the cases of exophthalmic goitre and hysterical hemiplegia.

As these patients improved and as their reflexes became less active, the reflex response to alcohol also became less evident. In typhoid toxemia, where the reflexes were sluggish, the action of small doses of concentrated alcohol was very slight. The same patients gave a much greater response during convalescence when their superficial and deep reflexes were approximately normal.

The degree and duration of the reaction also varied with the dose and with the concentration of the whiskey. Other things being equal, the reaction was greatest with large amounts of undiluted whiskey. Thus, in one patient 30 c.c. of whiskey diluted with 120 c.c. of water produced less effect than 5 c.c. of straight whiskey, which, in turn, had less marked action than 10 c.c. of undiluted whiskey.

Turning now to the effect upon the circulation, the changes produced in the heart rate were, on the average, so small that they were well within the normal fluctuations. The systolic blood pressure was increased, on the average, not more than 5 mm. of mercury. The maximum rise was noted one minute after the ingestion of the alcohol. Systolic pressure then gradually fell, so that the normal was reached well within a half-hour. The diastolic pressure was also elevated, proportionately more than the systolic. Its return to normal was, however, very much slower than that of the maximal pressure, so that the pulse pressure, after an initial increase in size, exhibited a prolonged decrease.

The velocity of the blood flow, the work of the heart, and the blood-pressure coefficient were determined according to Tigerstedt's formula. The change in velocity of flow was so slight that it may be disregarded. The work of the heart was slightly increased. This means

that the heart, in order to maintain the circulation, must do more than its usual work.

The blood-pressure coefficient showed a very distinct depression. In other words, the total effect of alcohol on the circulation was depression, not stimulation. The conclusions that were arrived at as a result of this study are:

Whiskey may raise the systolic blood pressure for a few minutes and thus act as an apparent stimulant to the circulation. It cannot, however, be regarded as a true circulatory stimulant, inasmuch as the efficiency of the heart as a pump is decreased. Diastolic blood pressure is disproportionately raised and pulse pressure is lowered. As a result of these actions the blood-pressure coefficient is decreased.

For a more detailed report of this study the reader is referred to the *Journal of the American Medical Association*, 1915, LXIV, 898–903.

PROGNOSIS IN CIRRHOSIS OF THE LIVER AFTER THE TAPPING STAGE

Based on Twenty-Five Cases Treated in The Roosevelt Hospital

By HENRY C. THACHER, M.D.,
ASSISTANT ATTENDING PHYSICIAN

Our most widely used American text-book of medicine apparently fully agrees with the experience of Hale White,* stating: "Of 34 cases with ascites 10 died before tapping was necessary; 14 were tapped and the average duration of life, after the swelling was first noticed, was only eight weeks; of 10 cases the diagnosis was wrong in 4, and in the remaining 6, who were tapped oftener than once, chronic peritonitis and perihepatitis were present."

The hospital experience since 1910 is too limited in autopsies to settle the question. It may, however, roughly indicate the prognosis to be expressed after a *clinical* diagnosis of cirrhosis of the liver with ascites (sufficient to warrant tapping) has been made.

The diagnosis of alcoholic cirrhosis (atrophic or fatty-cirrhotic) with marked ascites has been made 33 times in the last five years.

Of these we discarded 8 for definite cardiac disease, renal involvement of marked degree, or for suspicion of peritonitis, *i. e.*, cases in which the ascites might be due to other cases than the liver.

*Guy's Hospital Report, 1893, XLIX, 1.

This leaves 25 cases of clinical cirrhosis of the liver of the portal type, with ascites of sufficient grade to require tapping.

Of these, 7 died in the hospital with an average duration of life, after definite abdominal enlargement, of five weeks (if we exclude 2 cases of "4 years'" duration each); and 6.3 weeks after paracentesis was first employed.

The 18 who left the hospital "improved" had already lived an average of 5.25 months after first noting abdominal enlargement, and over four months after the first paracentesis. Of these, 3 had been tapped once, 3 twice, and 10 more than three times.

This decided difference in duration of life after tapping may be explained in one of three directions.

I. Our form of portal cirrhosis differs from that of the English school. This seems improbable, particularly as the majority of our cases are Irish, and there is no reason to regard our alcoholic liquors as purer than those of London.

II. Our diagnoses may be wrong, and cases of chronic peritonitis and capsular cirrhosis may be included. Yet the diagnosis of chronic peritonitis or capsular cirrhosis is by no means commonly made in the large autopsy service at Bellevue Hospital.

III. That we tap earlier is the more probable explanation. And one is strongly tempted to believe that the greater duration of life from the time of the first abdominal swelling is to be explained by the same fact—that we tap earlier, and more often.

Even these figures fully justify a more hopeful prognosis than do those of Guy's Hospital, when estimating the probable expectation of life from the date of first

paracentesis in *clinical* cases of alcoholic cirrhosis of the liver.

TABLE SHOWING RESULTS OF TAPPING IN TWENTY-FIVE CASES OF CIRRHOSIS OF THE LIVER

No. of cases	Result	Wassermann reaction	Duration of Life		No. of taps	Av. of patient's av. tap (liters)	Remarks
			After marked abdominal swelling	After first abdominal swelling			
1	Died	±	2¾ mos.	2½ mos.	2	8.56	
3	"Improved"	4+	6 + mos.	5½ mos.	8.6	5.9	Not considered luetic cirrh.
1	Died	—	"4 yrs." *	4½ mos.	14	6.7	Died after operation for permanent drainage.
1	Died	—	"4 yrs." *	11 days	2	5.1	Admission W. B. C. 16,-000. P.M. interlobular cirrh.
1	Died	—	3½ mos.	3¼ mos.	7	9.8	Moderate abdominal swelling 9 mos., severe for 3½ mos.
6	"Improved"	—	7.3 mos.	5.3 mos.	8.3	7.3	
1	Died	?	2½ wks.	2 days	1	7.5	Profuse hematemesis.
1	Died	—	?	3 days	1	16.5	Admitted, W.B.C. 26,000. Very marked icterus.
1	Died	—	3 wks.	1 wk.	1	"2"*	Admitted, leaking from recent tapping. R. B. C. 2,000,000.
9	"Improved"	—	3.7 mos.	2.8 mos.	4.1	7.2	
25			4.2+mos.	2.9 mos.	8.3	8.4	72 per cent left hospital temporarily improved.

* Figures of too doubtful value to include in averaging totals.

THE COMPLICATIONS AND MORTALITY IN THREE HUNDRED AND TWELVE CASES OF TYPHOID FEVER

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During the five years 1910–1914 there were treated 312 patients who had unmistakable typhoid fever. Certain other cases of irregular type, though possibly typhoid, have been excluded from this study because they lacked both cardinal signs and laboratory proof.

The course of the disease in these 312 cases showed the usual wide variations in fever curve, toxicity, and relapses.

Treatment was carried out in a routine way. Hydrotherapy by cold tubs, modified for old people, for young children, and for other special indications, was the chief weapon against the toxæmia. The diet was fluid and of a somewhat higher caloric value than in years previous. The main addition to the routine was the early removal of patients no longer on tubs to the balconies for continuous fresh air.

There were 48 children of 12 years and under, and 264 adults from 13 to 78 years of age. Of the adults 156 were male, 108 were female; of the children 29 were male, 19 female. The sex ratio was thus practically the same for both age groups, about 3 to 2.

Complications

Approximately every third patient, slightly more of the adult group, slightly fewer of the children, exhibited one or more complicating conditions. More exactly:

No. per patient	Of 264 adults	Of 48 children	Total
One complication	56	12	68
Two complications	30	2	32
Three complications	7	0	7
Five complications	1	0	1
	94 (35.6%)	14 (29.1%)	108 (34.6%)

This apparently high incidence is due to the inclusion of all the most trivial as well as serious conditions which occur in typhoid. Some are the direct result of the local or general activity of the typhoid bacillus, while others depend upon the entrance of some other micro-organism for which the typhoid fever has opened the door. Diseases which existed previously will be taken up separately and are not included here.

The table on next page shows the different complications in the two age-groups, listed according to the frequency of their occurrence. There follows a detailed analysis of each complication.

Intestinal Hemorrhage.—The seventh day was the earliest, the forty-fifth the latest, on which the first hemorrhage occurred. Fourteen of the 31 cases bled in the second week, 8 in the third; 68 per cent in the second and third weeks. Three patients passed safely through a primary attack and had hemorrhages on the ninth, thirteenth, and seventeenth days of relapse.

Complication	In 264 Adults		In 48 Children		In Total Series of 312 Cases	
	No.	Per cent	No.	Per cent	No.	Per cent
Intestinal hemorrhage	29	10.9	2	4.1	31	9.9
Furunculosis, minor	16	7.2	3	6.2	19	6.1
Furunculosis, general	3		..	..	3	
Pneumonia	15	5.6	1	2.1	16	5.1
Bronchitis, acute	18	6.8	3	6.2	21	6.7
Pleurisy, fibrinous	7	2.6	..	..	7	3.4
Pleurisy, sero-fibrinous	3	1.1	..	..	3	
Pleurisy, purulent	1	0.4	..	..	1	
Thrombophlebitis	9	3.4	1	2.1	10	3.2
Intestinal perforation	7	2.6	1	2.1	8	2.5
Paronychia	2	0.8	3	6.2	5	1.6
Alveolar abscess	4	1.5	..	..	4	1.2
Bed-sore	3	1.1	..	..	3	0.9
Otitis media	3	1.1	1	2.1	4	1.2
Cystitis	3	1.1	..	..	3	0.9
Appendicitis, acute	3	1.1	..	..	3	0.9
"Typhoid abscess"	1	0.4	1	2.1	2	0.6
Epididymo-orchitis	2	0.8	..	..	2	0.6
Neuritis	2	0.8	..	..	2	0.6
Typhoid spine	2	0.8	..	..	2	0.6
Periostitis	2	0.8	..	..	2	0.6
Colitis, chronic	1	0.4	..	..	1	0.3
Pyelitis	1	0.4	..	..	1	0.3
Thyroiditis	1	0.4	..	..	1	0.3
Meningitis	1	0.4	..	..	1	0.3
Mastitis, acute	1	0.4	..	..	1	0.3
Conjunctivitis	1	0.4	..	..	1	0.3
Diphtheria	1	0.4	..	..	1	0.3

The usual record was first "a trace of blood," followed the next day by the largest amount, with thereafter a progressive decrease. In some cases there was but a slight hemorrhage, in others the bleeding extended over a period as long as nine days. In a few instances there was a distinct intermission, but more often there was blood in the stools each day for four or five days.

The total amount lost varied between 90 and 4,000 c.c. with an approximate average of about 300 to 400 c.c.

Contributing Factors.—No evidence that tubbing or diet influenced the production of hemorrhage can be found in the records. Tubs were being given in 26, sponges in 5 cases, but bleeding was not less severe in those receiving sponges. Diet was strictly fluid in 27 of the cases when bleeding occurred. In the other 4 the slight additions did not seem sufficient to have started the trouble.

One patient bled profusely on the thirtieth day immediately after sitting up in a chair.

Meteorism was a prominent symptom in 10 cases. In 5 of these, hemorrhage followed directly upon enemata for relief of the distention. As the blood was dark the enemata could not fairly be blamed for the accident.

Symptoms.—It does not appear that a prediction of hemorrhage before the passage of blood by rectum was made at all, nor from a study of the charts could this safely have been done. The most constant change was a drop in temperature which showed in 18 of the 31 cases. In but 2 was this apparent before the blood was passed. The pulse was invariably weak and small, acceleration was noted in 14, no change in 15, a decrease in rate in 1. Large hemorrhages were accompanied by pallor, anxiety, sweating, and thirst. Restlessness was noted in 5 patients. A hemorrhagic eruption over the anterior chest and lower extremities developed in 1; another bled from vagina as well as into the skin and visible mucous membrane. The leucocytes increased in 12, decreased in 5, remained stationary in 14.

Relation to Other Complications.—Eight patients had no other complication. In 3 the hemorrhage was closely followed by intestinal perforation. Two were

subjected to celiotomy for perforations which were not found—and both died. One patient had pneumonia with defervescence before the bleeding; another recovered from hemorrhage only to die of a later pneumonia. Two developed bed-sores because they were kept on their backs for fear of starting fresh bleeding during the several days of successive hemorrhages. One of these died of the hemorrhage, the other of typhoid toxæmia.

Fatality of Hemorrhage.—While 14 of the 31 died, hemorrhage was directly responsible for death in only 7; and, in 2 of these, exploratory celiotomy perhaps should receive the greater blame. Thus there were really only 5 who bled to death. Of the other fatalities, 3 died of perforative peritonitis, 3 of toxæmia, 2 of pneumonia, and 1 of uncontrollable colitis long after the hemorrhage.

Treatment of Hemorrhage.—In addition to the routine stopping of tubs and diet, the ice-coil was applied to the abdomen in 18 cases. There is no evidence that it did any good. The use of morphine certainly checked restlessness, but it does not appear that the 10 patients so quieted did any better than those left without narcotics.

Calcium lactate was administered in 12 cases in doses from 1 to 2 gm. This drug seems totally ineffectual.

Four received rabbit serum, 1 horse serum, subcutaneously. Ascitic fluid was also given, by rectum in amounts from 150 to 180 c.c., and intramuscularly to the amount of 25 c.c. All were *in extremis* and all died. One child was given mother's blood by intramuscular injection, but received transfusions before the bleeding stopped.

Hypodermoclysis and intravenous infusion were tried

in 6 patients who showed signs of circulatory failure. All died.

Transfusion.—This seems to have been the most successful procedure. Two patients were treated in this way, and both recovered. A man of 49 years lost, in 2 hemorrhages close together, about 2 litres, and went into severe shock which seemed to presage death. Transfusion of 1,200 c.c. within two hours from the time of collapse brought immediate recovery and raised the hæmoglobin from 45 to 73 per cent, the systolic blood pressure from 45 to 105 mm. Hg. There was no further bleeding.

A girl of 10 had her first hemorrhage on the fourteenth day, and for five days thereafter. Her condition had been precarious from severe toxæmia before the hemorrhages began. She was given 20 c.c. of her mother's blood subcutaneously, but the bleeding continued. On the third day of hemorrhage she received 250 c.c. of her mother's blood, this time by transfusion; and, still bleeding on the fifth day, 260 c.c. from the father by transfusion. She bled no more.

Transfusion thus tided one patient over a dangerous exsanguination and supplied the other with enough fresh blood to meet the steadily recurring losses. In both cases the blood volume was kept high enough for ordinary purposes, and perhaps the new blood may have contributed to the sealing of the leaks; but it is impossible to adduce from these 2 instances good evidence that the new blood had such clotting action.

It seems fair, however, to say that the modern care of typhoid almost requires that a donor of blood be located before the second week, so that there may be no

time lost if the bleeding be severe enough to call for this treatment. Not every patient who bleeds will need transfusion, but it is possible that its more frequent use might help some cases to fight the storm of toxæmia which otherwise in their anæmic condition they might not be able to weather.

Intestinal Perforation.—One boy, 4 men, and 3 women suffered this accident. Of the 8 but 1 recovered—a mortality of 87.5%. The age, sex, and mode of onset, with result of operation, are shown in the table.

Sex	Age	Onset	Time of operation after onset	Result
Male	9	Sudden 19th day.	8 hours after.	Died 11 days.
Male	14	Sudden 14th day.	2 hours after.	Died 6 days.
Female	19	Slow 13th day.	16 hours after.	Died 4 days.
Male	21	Slow 27th day.	32 hours after.	Died 7 hours.
Male	25	Sudden 20th day.	15 hours after.	Died 5 days.
Female	27	Slow 20th day.	24 hours after.	Recovered.
Male	30	Not suspected.	None.	Died 2 (?) days.
Female	33	Slow 14th day.	19 hours after.	Died 13 hours.

The previous condition of these patients showed profuse bleeding in 3, marked toxæmia in 3. Meteorism was present in all; to a great degree in 5.

Onset.—In 3 the symptoms were clearly defined and led to immediate diagnosis. In 4 the evidence was of slow and indefinite development, and the diagnosis arrived at only when there was some peritonitis present. One was so badly poisoned by the typhoid that there were neither symptoms nor physical signs, and the diagnosis was made only at autopsy.

Pain was sudden, sharp, and severe in 3; moderate and not sudden in 2; absent in 3. Its absence ap-

parently depended to some extent upon the clouding of mentality.

Vomiting occurred at onset in 2.

Chill occurred in 2.

Temperature fell in 6.

Pulse.—The records do not supply data of early change. Later there was usually some increase in rate.

Tenderness was found in 6, absent in 2. It was general in 4, localized to the left lower quadrant in 1, and to the right upper in 1.

Rigidity was noted in the 6 with tenderness.

Movable dulness was noted in 4.

Obliteration of liver dulness occurred in 3.

The lucky woman who recovered had a severe infection masking by its toxæmia the onset of the perforation. In addition to all the physical signs, there was noted bulging of the vaginal fornices and succussion by vaginal and rectal examinations.

Respiratory Complications.—*Bronchitis* was noted in 21, all of whom had either marked signs, or cough, which needed treatment. Possibly there were a number whose bronchitis was not sufficient to demand a note by the interne.

Pleurisy appeared in 10 patients. Seven of these had only a dry pleurisy. Three had serous effusions, apart from the effusion secondary to pneumonia. The amount of fluid was small in contradistinction to the usual condition in pleural effusion of other origin. One severely poisoned patient had a purulent pleurisy to which was attributed his death. Cultures and smears from the serous fluid were negative. Smears of the purulent fluid showed a gram negative bacillus which refused to grow, and could therefore not be identified. This patient also

had a general pustular, or furuncular eruption, and an abscess of the shoulder region from the pus of which the typhoid bacillus was cultivated. He died.

Pneumonia showed in 11 patients an acute onset and course which suggested a pneumococcus infection. In only 1 of these, a relapsing pneumonia, was a pneumococcus recovered from the blood. One of the cases was a post-operative pneumonia after appendicectomy in the first week of his typhoid. In the other 4 patients the pneumonia was of the irregular type, probably of hypostatic origin. Two-thirds of the cases developed in the third week. Serous effusion of moderate degree followed in 3 of the 16. In the 1 child, lung abscess with partial recovery followed the pneumonia. Phlebitis occurred in 4 of the pneumonia patients, as compared with only 5 cases of phlebitis in the rest of the entire series. While 7 patients died, pneumonia was the direct cause in only 5, a mortality for pneumonia complicating typhoid of 31.1 per cent.

Acute Appendicitis.—Three adults exhibited, in addition to the usual symptoms of onset of typhoid, severe pain so localized that they were sent to the hospital as appendicitis. Two of these had vomiting, pain, local tenderness, and rigidity, increase in leucocytes and neutrophiles. The appendix was acutely inflamed when removed. Culture grew the colon bacillus in 1 of these. The third case had pain of cramp-like nature, slight tenderness, no rigidity, marked increase of leucocytes and neutrophiles. The appendix was long, bound down by old adhesions, sharply kinked, and sections showed mild acute inflammation with evidence of some old thickening. Perhaps the pain was merely an appendicular colic. The diagnosis of typhoid was made either by the

appearance of the intestines at operation or by the high post-operative temperature which led to cultures and Widal tests. The course of the typhoid was not affected in 2, but in the other a post-operative pneumonia resulted in death.

Phlebitis.—Among the adults there were 9 cases, all beginning in the veins of the left lower extremity, 1 involving also the right saphenous vein. One child of 4 developed a swollen foot which led to a diagnosis of phlebitis of the dorsalis pedis vein.

Furunculosis and Other Abscesses.—Trifling infections were frequent; paronychia in 2 adults and 3 children; alveolar abscess from carious teeth in 4 adults. A small number of furuncles and other abscesses of the subcutaneous tissues developed in 16 adults and 1 child. Cultures were made in only 4 instances and yielded Staphyl. pyog. aur. three times, Staph. albus once.

General Furunculosis.—Three adults presented a marked eruption of boils and pustules, presumably of pyogenic origin, although cultures and smears were unfortunately not made. All of these cases were severely toxic and possibly the boils added materially to the toxæmia. One of them had so many boils on the buttock that a condition of real gangrene arose. He recovered. The 2 other patients died, 1 of suppurative pleurisy, the other of toxæmia alone.

Bed-sores appeared in 3 adults who were obliged to lie a long time on the back because of hemorrhage, and in the process of recovery from operation for perforation. The hemorrhage cases died.

Typhoid Abscess.—One adult had a subcutaneous abscess of the shoulder region, 1 child an abscess of the outer part of the foot. From both were grown the typhoid

bacillus. In the child this was the only laboratory evidence of typhoid, although the essential physical signs were present.

Otitis Media.—Three adults and 1 child developed a double otitis media with purulent discharge. Other micro-organisms than the typhoid bacillus were grown in culture.

Epididymo-Orchitis.—One patient was 48, the other 70 years of age. There was nothing to suggest a gonorrhœal origin. One had also a rather persistent hydrocele.

Typhoid Spine.—Both cases developed on the twenty-seventh day. Pain in the lower lumbar region, radiating to the hips, was the first evidence. There was no difficulty in walking, no swelling or disturbance of sensation, but muscle cramps were extremely distressing. During the onset each had an increase of fever lasting seven and ten days respectively. X-ray plates of 1 case showed no bone lesion, though there was a suggestion of some change in the sacro-lumbar joint.

Neuritis.—One patient, who had also hemorrhage, dry pleurisy, periostitis of a rib, and a thigh abscess, developed tenderness along the course of the anterior tibial nerve and distinct impairment of flexion of the ankle. There was no atrophy of the calf, though there remained weakness in flexion for a long time.

Periostitis.—Two adults had non-suppurative periostitis of one or more ribs. One of these 2 had also a positive Wassermann reaction.

Pyelitis occurred on the thirty-third day, ten days after defervescence, accompanied by a four days' septic type of high fever. The typhoid bacillus was not to be isolated.

Cystitis also failed to yield the bacillus in the 3 cases who had bladder symptoms as well as pyuria.

Conjunctivitis of catarrhal variety began before admission on the tenth day and persisted until discharge on the thirty-sixth day. No bacteriological record exists.

Acute Mastitis.—An unmarried non-pregnant girl of 14 developed on the thirty-third day a tender, painful lump covered by reddened skin, and accompanied by high fever. By the thirty-seventh day all symptoms had disappeared except a small non-tender lump which remained until discharge.

Colitis.—In a man of 39, who had never before had colitis, the temperature curve took on a protracted course which never reached normal during the eighty-eight days before he died. Diarrhœa had been moderate at first, subsided, then returned on the twenty-eighth day. Nothing controlled the vicious frequency of loose stools with mucus. Finally, after two months of increasing cachexia, an appendicostomy was performed, but even irrigation through the appendix failed to prevent death from exhaustion.

Meningitis.—A girl of 16 apparently had the meningeal form of typhoid, and the spinal fluid was sterile with only a slight excess of cells. The Widal was positive, but blood culture negative. She showed stiffness of the neck and Kernig's sign. As she also showed ocular paralysis with the slow high tension pulse of intracranial pressure, and a drop of temperature to 96°, it seems fair to conclude that there was a true meningitis. Unfortunately, there was no autopsy to substantiate or disprove this diagnosis.

Diphtheria.—This patient had an ordinary pharyngeal diphtheria, received huge doses of antitoxin, but

her heart grew steadily weaker and she died. Apparently there was no definite tachycardia which could be attributed to the diphtheria poison, but presumably she died of a combination of the toxæmias.

Pre-existing Associated Conditions

Pregnancy.—This woman passed safely through her fever and two weeks after defervescence was delivered of a dead fœtus about six months in size. No notes were made which indicate the time of fœtal death in relation to the fever.

Epilepsy, gonorrhœa, rheumatic arthritis occurred, but had no bearing on the typhoid fever.

Syphilis with tertiary ulceration of the face accounted for the bad condition of a man whose death was attributed to typhoid toxæmia.

Valvular Heart-Disease.—Seven adults from 14 to 42 entered typhoid with one or another old valvular heart lesion. In no case was the heart embarrassed until late in the disease. The disadvantage of the handicap appears from the fact that 2 of these 7 died. One death was during the course of complicating pneumonia, but the other death took place from acute cardiac dilatation due evidently to the strain of the typhoid fever alone.

Reynaud's Disease.—A colored child of 19 months, with a positive Wassermann reaction, entered for symmetrical gangrene of both hands and feet. She ran a low, irregular fever from the sloughing tissue absorption. The temperature rose at one time in a way which suggested typhoid, and the Widal reaction was found to be positive. This was some time after her admission, and her typhoid must have been contracted in the children's

ward, unless the fever attributed to the gangrenous extremities really belonged to infection by the typhoid bacillus. She recovered from the typhoid infection—minus some members.

Mortality

Of the whole series 30 died, a death-rate of 9.6 per cent.

Age.—27 were adults, a rate of 10.2% in 264. 3 were children, a rate of 6.3% in 48. It is interesting to note that of the really old patients one of 70 years recovered, and the other died of hypostatic pneumonia at 78.

Sex.—Comparison of the fatality in the two sexes in adults shows that the disease was almost twice as fatal to men as to women, although there were only 3 men treated to every 2 women. Thus, of 156 men 20, or 12.8 per cent, died; of 108 women only 7, or 6.5 per cent, died.

CAUSES

Main cause for all ages		Contributing
Perforation	7	Previous hemorrhage in 3.
Hemorrhage	7	Needless celiotomy in 2.
Pneumonia	5	Senility in 1. Valvular heart in 1.
Typhoid toxæmia	5	Delirium tremens in 1. Bed-sore in 1. Tertiary syphilis in 1. Valvular heart in 1.
Meningitis	1	
Chronic ulcerative colitis	1	
Suppurative pleurisy	1	
Cardiac dilatation	1	
Diphtheria	1	

In this hospital, during the period 1877–1883, there were treated 147 cases, and 29.9% died. In the five years 1900–1904 there were treated 584 cases and 13.0% died. This diminution in the death-rate, which has been continued to the present rate of 9.6%, shows that the disease has progressively decreased in fatality. It is impossible to state upon what factors this improvement depends, whether upon better treatment and nursing or upon a decrease in the virulence of infection. Since treatment has changed but little since 1877, it appears to the writer that the disease may have lost some of its virulence.

My thanks are due to Doctors Sumner, Lieb, Hartshorn, and West, for assistance in compiling these statistics.

BACTERIEMIA

Summary of Cases at The Roosevelt Hospital Showing Pyogenic Bacteria in the Circulating Blood with Clinical Recovery

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In our work in the wards and laboratory we have been so impressed with the number of cases of true sepsis and of secondary bacteriemia with recovery, that it has seemed worth while to place them upon record by a brief analysis.

These cases are drawn from the Medical, Surgical, and Gynæcological Divisions of the hospital. For the sake of brevity they are reported in tabular form, the history numbers and laboratory numbers being given in case more detailed reference is desired.

Only such cases as have shown actual clinical recovery with subsidence of fever and all other important symptoms at the time of discharge from the hospital are included.

Of the 27 cases showing pyogenic organisms in the circulating blood, with recovery, observed during the past four years in the various services of The Roosevelt Hospital, 12 were staphylococcus cases, 11 of which were

Case No.	Age	Diagnosis	History	Leucocytes	Blood Culture	Treatment	Result
A. 1695	16	Streptococcus abscess. Deep cervical glands. Staphylococcus bacteriemia.	Temperature normal on admission, to 103.4° after operation, normal in 3 days.	VI, 13, 9,000. Poly. 72 per cent.	VI, 13, 11, staphylococcus aureus, 6504,† (2 of 6). Staphylococcus aureus. Culture deep cervical glands = Streptococcus.	Exclsion of lymph nodes on left side of neck.	Cured.
B. 3967	42	Cellulitis of right lower leg. Staphylococcus aureus bacteriemia.	Painful swelling of right leg and foot from trauma. Carbuncle developed on right arm. Temperature intermittent to 106°, normal after VI, 1.		B. 3107, V, 2, 13, temp. 103. 2°, 2.30 P. M. Staphylococcus aureus,† (2 of 5). B. 3118, V, 3, 13, temp. 104°, 2.45 P. M., no growth. B. 3346, V, 23, 13, temp. 103.8°, 11.30 A. M., no growth.	Multiple incisions and drainage.	Cured.
B. 4517		Staphylococcus aureus sepsis.	Pains in hip and thigh, fever. Temperature remittent to 102.3°; normal after XI, 29.	*11,000. Poly. 72 per cent.	B. 5039, XI, 25, 14, temp. 101°. Staphyloccus aureus† (2 of 7). Plates O. B. 5061, XI, 27, 14, temp. 101°, 3 P. M. Staphylococcus aureus† (3 of 6), Plates O.	Palliative.	Cured.
A. 5096	9	Suppurative osteomyelitis of left tibia, of right radius; suppurative arthritis of right kneo. Staphylococcus sepsis.	Chills, fever, swelling of feet, pain following trauma. Typhoid at 4.	22,600 to 37,200. Poly. 84 to 88 per cent.	B. 5368, XI, 32, 14, staphylococcus aureus† (2 of 7). Plates O.	Amputation of leg. Partial ostectomy of right radius. Incision and drainage of right patelia. Vaccines.	Cured.
A. 4815	18	Chronic suppurative osteomyelitis of shaft of humerus. Staphylococcus aureus bacteriemia.	Pain in right upper arm following trauma; chills, fever. Preceding onset boils on neck.	25,000. Poly. 88 per cent.	B. 6023, III, 13, 14, temp. 98.4°, 5 P. M. Staphylococcus aureus,† (3 of 6), Plates O.	Incision of outer aspect of lower third of arm; sequestrum removed.	Cured.
A. 4763	32	Chronic suppurative osteomyelitis of tibia. Staphylococcus aureus bacteriemia.	Inflammatory swelling of tibia for three months. Incision six weeks before admission, pus obtained; persistent sinus.		B. 6049, III, 10, 14. Temp. 98°, 2.30 P. M. Staphylococcus aureus,† (3 of 6), Plates O.	Sequestrotomy, partial osteotomy of tibia.	Cured.
D. 2058 B. 1954	33	Subphrenic abscess. Staphylococcus aureus sepsis. Multiple skin abscesses.	During lobar pneumonia with dry pleurisy developed pain in right lower quadrant.	VIII, 14, 11,000. Poly. 72 per cent. Lymph. 20 per cent. Largemono. 3 per cent. Trans. 5 per cent.	7371, IX, 12, 11, temp. 101°, 2.30 P. M. Staphylococcus aureus,† (5 of 8) (1 per c.c.). 7456. Subphrenic abscess culture aureus.	Appendix removed, abscess drained IX, 15.	Cured.

C. 2457	55	Left hydrosalpinx, left salpingo-oophorectomy. Staphylococcus bacteriemia.	Temperature to 101° intermittent, normal after V, 5.	*13,000. Poly. 88 per cent.	B. 3063, IV, 29, temp. 98, 12.30 P. M. Staphylococcus aureus,† (1 of 4).	Left salpingo-oophorectomy.	Cured.
C. 4413	26	Peritoneal abscess (pelvic). Staphylococcus. Pyogenes aureus bacteriemia.	Intermittent temperature to 104° until few days before discharge.	*16,000. Poly. 90 per cent.	B. 6671, V, 10, 14, temp. 101°, 5 P. M., no growth. B. 6988, VI, 7, 14, 10 P. M. Staphylococcus aureus† (2 of 5). B. 7291, VII, 5, 14, temp. 100°, 12.30 P. M., no growth.	Posterior colpotomy.	Cured.
D. 1030	48	Typhoid fever, acute. Orchitis, acute. Epididymitis, hydrocele of tunica. Vaginalis. Staphylococcus bacteriemia.	Temperature remittent to 105.3° after IX, 16, normal.	*5,700. Poly. 51 per cent.	3618, VIII, 29, temp. 103°, 4.30 P. M. Staphylococcus albus in all media† (7).		Cured.
A. 1812	31	Chronic otitis, chronic mastoiditis, chronic appendicitis. Staphylococcus aureus bacteriemia.	Following a fall loss of consciousness, abdominal pains, chills, vomiting; chills and fever in Mexico, 1910; ill six weeks. Marked tenderness over right lower quadrant. Rectal tenderness in right fossa for seven days. Right mastoid tender, slight discharge from ear, severe headache, and some ringing in right ear. Temperature continued for three days to 101°, then intermittent, normal after seven days.	*14,200. Poly. 81.5 per cent.	6951, VII, 26, 11, temp. 100.4°, 6 P. M. Staphylococcus aureus. Capsulated streptococci† (3 of 5) media.	Appendicectomy.	Cured.
D. 3407	30	Staphylococcus bacteriemia with metastasis.	Pain in leg, arm, wrist. Patient thought to have typhoid, and sent to hospital as such. Pain in right chest, and cough. Furuncle on buttock incised six weeks before. Temperature intermittent with chills, 98 to 105°, after I, 26, normal.	*15,400. Poly. 78 per cent. XII, 18, 17,-400. Poly. 77 per cent. I, 12, 16,800. Poly. 68 per cent, I, 12, 14,000.	8031, IX, 24, 11, temp. 103.4°, 8 P. M. = 0. 8253, XII, 18, 11, temp. 104°, 4 P. M. = staphylococcus aureus, 1 per c.c.†(4 of 7). 8362, I, 1, 12, temp. 100.8°, noon, = staphylococcus aureus, 0.5 per c.c. † (4 of 6). 8455, I, 12, 12, temp. 98°, 2 P. M.= staphylococcus aureus†(1 of 5). Sputum: aureus+	Palliative.	Cured.
A. 1495	27	Scarlet fever, streptococcus pyogenes bacteriemia without metastasis.	Fever, sore throat, prostration. III, 15, well-marked erythema on neck, chest, back, and abdomen. Angina and other symptoms of scarlatina. III, 25, pain in left ear, reddening and bulging of the drum. Temperature subcontinua to 104.3° for three days, gradual fall to 100° maximum III, 29, to 105.3°. After IV, 8, normal.	111, 29, 15,000 Poly. 93 per cent. III, 28, 11, 15,500. Poly. 93 per cent.	5759, III, 28, 11, noon, hemolytic streptococcus (100 per c.c.). 5776, III, 30, 11, 3 P. M., hemolytic streptococcus (2 per c.c.). 5796, III, 31, 11, 6 P. M., hemolytic streptococcus (2 per c.c.). 5804, IV, 1, 11, 9 P. M., hemolytic streptococcus (9 per c.c.).	Partial mastoidectomy, phlebotomy of left lateral sinus.	Cured. ‡

Case No.	Age	Diagnosis	History	Leucocytes	Blood Culture	Treatment	Result
A. 198	24	Acute otitis media. Streptococcus bacteriemia.	Chronic otitis media, right. Frequent sore throat and cough. For two weeks pain and tenderness in right ear, following a sore throat; yellowish pus discharge from ear. Temperature intermittent to 101°, gradually falling to normal.	*14,900. Poly. 78.5 per cent.	2187, III, 11, 10, hemolytic streptococcus (6 per c.c.).	Paracentesis.	Cured.
A. 370	32	Septic infarcts of kidney. Streptococcus septicemia.	Pain in abdomen, especially left side; much rigidity of left lumbar region. Vomited several times, blood in stools at beginning of illness.	*15,000. Poly. 83 per cent.	2354, IV, 13, 10, streptococcus hemolyticus. 2380, IV, 14, 10, streptococcus hemolyticus (3 or 4 per c.c.).	Palliative.	Cured.
A. 5223	20	Acute mastitis, abscess of breast; streptococcushemolyticus bacteriemia.	Abscess in left breast. Had similar trouble in right breast six months ago: in hospital for treatment. Six weeks ago, a few days after birth of baby, breast began to get hard in places, skin red and pains in left axilla, chills, fever. Temperature to 102.2° after operation, normal third day. VIII, 15, chill, temperature to 105.3°, intermittent with chills to 106.3°, normal after VIII, 24.	VIII, 15, 32,000. Poly. 93 per cent. VIII,17,13,000. Poly. 82 per cent.	B. 7668, VIII, 15, 14, temp. 105.2°, 12.30 P. M., streptococcus bemolyticus† (3.5 per c.c.) (3 of 4). B. 7677, VIII, 16, 14, temp. 101.6°, 2 P. M., no growth. B. 7739, VIII, 21, 14, temp. 105°, 5 P. M., no growth.	Multiple incisions and drainage of breast.	Cured.
A. 2253 A. 2623	50	Adeno-carcinoma of breast, with metastasis in the axillary fat. Chronic endocarditis. Streptococcus viridans sepsis.	VII, 10, 10. Complete right mastectomy for adeno-carcinoma of breast. Following operation nervousness, restlessness, stiffness about head, headache, and nausea. XII, 9, 11, drowsy all day, chilly sensations, followed by flushings; delirium at night. Temperature normal on admission. To 103° third day after operation. Intermittent 98 to 102.3° to twelfth day.	XII, 7, 9,400. Poly. 56 per cent.	8154, XII, 8, temp. 101°, 8.50 P. M., streptococcus viridans† (2 of 8). 8217, XII, 15, temp. 99°, 10.15 A. M., streptococcus viridans† (2 of 6). 8675, XI, 7, 12, temp. 99°, 4 P. M., no growth.	Vaccines.	Cured. (1914, patient is in normal health.)
D. 4654	45	Streptococcus viridans sepsis.	Abdominal pain for six weeks, chills and fever two weeks, lost 20 pounds. Excepting a slight yellowish tinge of the skin and sclerae, a somewhat cachectic appearance, physical was negative. Temp. 104.2° on admission, normal two days, then intermittent 99 to 105° with chill; after IV, 18, not over 101°.	*24,000. Poly. 78 per cent. IV, 14, 14,600. Poly. 75 per cent.	B. 2789, IV, 4, 13, temp. 104.6°, 11.30 P. M., streptococcus viridans† (4 of 7). B. 2837, IV, 8, 13, temp. 104°, 1 P. M., streptococcus viridans† (0.25 per c.c.) (3 of 6). B. 2891, IV, 12, 13, temp. 102°, 8 P. M., streptococcus viridans† (9 per c.c.) (6 of 6). B. 2898, IV, 14, 13, temp. 102.8°, 4 P. M., chill, streptococcus viridans† (1 per c.c.) (2 of 4).	Palliative.	Cured.

D. 1537 D. 1538	27	Subacute arthritis, chronic endocarditis, streptococcus viridans bacteriemia.	Pain in feet and legs on walking, no chills or fever. Pericarditis, dry; left hydrothorax, spleen enlarged, systolic murmur at apex, acute rheumatic arthritis nine years ago. Scarlet at 10, appendicectomy 1907. Temp. 100.2° on admission, no subsequent fever.	*9,000. Poly. 36 per cent.	5191, streptococcus viridans† (2 of 7).	Salicylates.	Cured.
A. 1719	21	Chronic streptococcus, arthritis of knee-joint, streptococcus bacteriemia.	Swollen and painful foot. Five years before similar pain. No fever.	*13,400. Poly. 66 per cent.	6689, VII, 2, 11, temp. 99°, streptococcus viridans† (2 of 6).	Salicylates.	Cured.
B. 2087	14	Acute appendicitis with retrocecal abscess, subsequent peritoneal abscess, parotid slaiadenitis, fecal fistula. Streptococcus septicemia.	Pain in left lower quadrant.	22,400. Poly. 86 per cent.	7455, IX, 22, 11, temp. 102°, 6 P. M. attenuated streptococcus† (2 of 5). Plates O.	Incision and drainage of appendical and of subsequent abscess.	Cured.
D. 4908	34	Acute articular rheumatism, attenuated streptococcus bacteriemia.	Pain in all joints. Scarlet fever and diphtheria two years ago. Three weeks ago sore throat, chills, and fever. Temperature intermittent type, normal after VII, 10.	V, 31, 19,900. Poly. 79.2 per cent. Lymphocytes 20 per cent. Eos. 0.8 per cent. Hemoglobin 75 per cent.	B. 3645, VI, 29, 13, temp. 98.6°, 12.15 A. M., attenuated streptococcus† (1 of 5). B. 3736, VII, 10, 13, temp. 102°, 7.30 P. M., attenuated streptococcus (viridans)† (1 of 3).	Salicylates.	Cured.
D. 6041	47	Suppurative pericarditis, lobar pneumonia, suppurative pleurisy, arthritis right wrist, pneumococcus sepsis.	Cough, dyspnœa, nausea, pain in left side and shoulder, sputum blood-streaked, profuse sweating. Pericardial effusion. (Pneumococci+.) Pleural effusion. (Pneumococci+.) Pain, redness, swelling of right wrist. Temperature remittent to 103.2°	*63,200. Poly. 98 per cent. V, 20, 20,000. Poly. 87 per cent.	B. 6693, V, 12, temp. 101°, few pneumococci† (2 of 5). B. 6761, V, 16, temp. 100°, 8 P. M., no growth.	Serum 25 c.c. in pericardium; 175 c.c. intravenously V, 14. Incision and drainage of pericardium and pleura.	Cured.
D. 6526	45	Friedlander's bacillus sepsis.	Chills, fever, severe headache; later cellulitis of left leg. Rheumatism ten years ago. Temperature intermittent with chills 98 to 106.3°, after X, 16, not over 102°. XI, 4, intermittent temperature to 104.2°.	*9,000. Poly. 87 per cent. X, 10, 13,800. Poly. 90 per cent.	B. 8164, X, 9, 14, temp. 98°, noon, bacilli mucosus capsulatus† (2 of 2). B. 8173, X, 10, 14, temp. 99°, 3 P. M., bacilli mucosus capsulatus† (1 of 4). B. 8207, X, 13, 14, temp. 99°, 1 P. M., bacilli mucosus capsulatus† (4 of 4, few per c.c.). B. 8423, X, 31, 14, temp. 99°, no growth. B. 8441, XI, 2, 14, 6 P. M., no growth. B. 8675, XI, 21, 14, temp. 101.2°, 4 P. M., no growth.	Hypodermic abscess. Transferred to surgical. Incision and drainage of right leg.	Cured.

Case No.	Age	Diagnosis	History	Leucocytes	Blood Culture	Treatment	Result
C. 278	26	Pelvic abscess, streptococcus septicemia.	Pain in left lower quadrant, free discharge, fever, inflammatory mass left lower quadrant and left fornix. Temperature intermittent to 103.2°.	*II, 15, 10,-700. Poly. 77 per cent. Trans. 9 per cent. Lymph. 10 per cent. Large mono. 4 per cent.	2280, IV, 5, 10, streptococcus hemolyticus† (2 of 7).	Left salpingo-oophorectomy. Posterior colpotomy, Drainage. Vaccines.	Cured.
E. 360	13	Acute articular rheumatism, chronic endocarditis, acute cardiac dilatation, hydrothorax, streptococcus viridans bacteriemia.	Frequent attacks of rheumatism since infancy. Tonsillectomy one month ago. Polyarthritis with fever, duration two weeks. Temp. 98 to 104.4° subcontinua.	XII, 3, 14, 24,-300. Poly. 74 per cent. Lymph. 26 per cent. Hgb. 70 per cent.	B. 8927, streptococcus viridans. 4, 14, 14, in deep agar† (1 of 7).	Thoracentesis, salicylates.	improved
C. 2238	32	Right and left pyosalpinx. Pelvic abscess. Thrombophlebitis of left femoral vein. Anærobic streptococcus bacteriemia.	Following a six-months' miscarriage nine days ago chills, fever, severe pain in lower abdomen, slight headache. Inflammatory mass in right fornix. Temperature septic type, normal after I, 14.	*26,400. Poly. 89 per cent. Lymph. 11 per cent.	B. 1974, anærobic streptococcus.	Posterior colpotomy with drainage.	Cured.

* Blood count on admission. † Figures designate the number of media showing positive cultures.
‡ Has remained entirely well and is in active practice of his profession.

staphylococcus aureus, 1 staphylococcus albus; 13 were streptococcus cases, 5 streptococcus hemolyticus, 5 streptococcus viridans, 3 unclassified streptococcus. One case of true pneumococcus sepsis recovered, and 1 showing Friedlander's bacillus.

Of the lesions present in the staphylococcus cases, 3 were osteomyelitis (A. 5096, A. 4815, A. 4763); 2 general sepsis, 1 with (D. 3407), the other (B. 4517) without, metastases; 1 cellulitis (B. 3967); 1 subphrenic abscess (D. 2058); 2 pelvic abscess (C. 2457, C. 4413); 1 epididymitis (D. 1030); 1 appendicitis (A. 1812). One case followed excision of lymph nodes (A. 1695).

In the above cases the bacteriological findings in A. 1695 and A. 1812 were questionable, since they were not confirmed. In case B. 4517 and D. 3407 the findings were confirmed by subsequent blood cultures. The other cases with staphylococcus aureus in the blood were types which gave clinical corroboration.

The 5 streptococcus hemolyticus cases included sepsis following scarlet, 1 (A. 1495); otitis media, 1 (A. 198); acute mastitis, 1 (A. 5223); kidney infarction, 1 (A. 370); pelvic abscess, 1 (C. 278).

In cases A. 5223, A. 1495, A. 196, the growth was sufficiently characteristic and abundant to need no further confirmation. In A. 370 there were 2 positive cultures.

Of the streptococcus viridans cases, 1 followed mastectomy in a patient who developed fever after the operation and who had chronic endocarditis with mitral insufficiency (A. 2253); 2 were associated with arthritis and endocarditis (D. 1537, E. 360); 1, arthritis alone (A. 1719); while 1 was general sepsis (D. 4654). Three

of the 5 streptococcus viridans cases, therefore, showed endocarditis.

In these cases a diplococcus or streptococcus which grows green in blood, and is not dissolved by bile and is gram positive, is considered streptococcus viridans.

Of the unclassified streptococcus cases, 1 followed appendicitis and peritoneal abscess (B. 2087); 1, pelvic abscess (C. 2238); 1, arthritis (D. 4908).

The unclassified streptococci are those which were not hemolytic and did not produce green colonies in blood agar.

In presenting this series of 27 cases of blood invasion by pyogenic organisms with recovery, it is realized that some of these cases may not prove recoveries in the strictest sense of the word. The possibility of relapses after months or years of freedom from symptoms is appreciated. Especially might this be true of cases showing streptococcus viridans or staphylococcus aureus. However, as far as we have been able to ascertain, the cases here reported are in health at the present writing.

Our study of this group has confirmed an impression that a positive blood culture is far from a death sentence.

REPORT OF BLOOD CULTURES EXAMINED IN THE PATHOLOGICAL LABORATORY, THE ROOSEVELT HOSPITAL

From May, 1909, to January, 1915

By BALDWIN MANN, M.D., LAURENCE F. RAINSFORD, M.D., AND MORTIMER WARREN, M.D.

The results are grouped as follows:

A. Typhoid cultures.

B. Pneumonia cultures.

C. Miscellaneous cultures.

D. Negative cultures, "septic" cases.

A. Typhoid Cultures.—This includes all cultures where a tentative diagnosis of typhoid fever was made, giving a total of 824 cultures from 767 persons, of whom 391 were cases of typhoid fever as shown either by positive culture or by typical clinical course.

The total number of positive cultures was 332, taken from 301 persons; this gives 77 per cent positive blood-culture findings in a total of 391 cases of typhoid fever in which 547 cultures were taken.

In the first week of the disease, of 115 cultures 89 were positive, or 80 per cent.

In the second week of the disease, of 133 cultures 82 were positive, or 62 per cent.

In the third week of the disease, of 67 cultures 33 were positive, or 50 per cent.

In the fourth week (or over) of the disease, of 66 cultures 24 were positive, or 36 per cent.

In 187 negative cultures the Widal * was positive at time of culture in 94, or 51 per cent.

In 283 positive cultures the Widal was positive at time of culture in 169, or 49 per cent.

In 547 blood cultures at various times from typhoid-fever patients the result was positive 332 times, or 60 per cent.

In 519 blood cultures in which a Widal was done at the time of culture, either culture or Widal † was positive 428 times, or 82 per cent.

This gives an average of about 1½ cultures to each case, by which means a positive diagnosis was arrived at in 77 per cent of the cases, whereas, if only 1 culture had been taken during the course of the disease, a diagnosis would have been reached in only 60 per cent of the cases, but by the addition of an agglutination test to 1 culture during the course of the disease, a positive diagnosis was made in 82 per cent of 519 cases.

B. Pneumonia Cultures.—There were 167 blood cultures on 155 persons, of which 47 were positive and 120 were negative, *i. e.*, 28 per cent positive. (Of positive cases 4 had lesions in addition to those of the lungs. There were 6 in which there is no mention of pneumonia,

* The Widal reaction represents either:
A 1 to 50 serum dilution for the microscopic test, or
A 1 to 100 serum dilution for the macroscopic test.

† It is interesting to note that there were 2 cases giving positive Widal reactions, neither of which was ill with typhoid fever at the time of blood culture, but both of which cases had a recent typhoid history. These were the only cases not typhoid at the time which gave a positive Widal reaction.

and 1 case of meningitis in which the condition of the lungs was undetermined.)

C. Miscellaneous Cultures.—*Positive Cultures of:*

1. *Streptococcus Viridans.* Fifty-four cultures on thirty-three persons. (Including 4 cultures on four persons, of undifferentiated streptococci which were neither hæmolytic nor green.)

2. *Staphylococcus Pyogenes Aureus.* Forty-nine cultures on thirty-six persons. (Chiefly cultures on cases of osteomyelitis.)

3. *Streptococcus Hæmolyticus.* Forty-five cultures on thirty-two persons. (Chiefly cultures on cases of puerperal septicæmia.)

4. *Bacillus Paratyphosus.* Seven cultures on seven persons. (All of the *B* type. All on cases running a typhoid course.)

5. *Bacillus Coli.* Six cultures on five persons. (One on a case running a typhoid course. One possible contamination on a case of typhoid fever. One mixed with a streptococcus from a case of septicæmia following otitis media. Two on cases of post-operative septicæmia: (1) Sloughing carcinoma of uterus. (2) Acute and chronic cholecystitis, chronic appendicitis.)

6. *Staphylococcus Pyogenes Albus.* Five cultures on three persons. (One on a case of subacute endocarditis. One on a case of endocarditis, mixed with bacillus influenzæ. One on a case of typhoid fever.)

7. *Bacillus Mucosus Capsulatus.* Four cultures on 1 person. (On a case of septicæmia.)

8. *Bacillus Influenzæ.* Three cultures on two persons. (Each a case of endocarditis.)

9. *Streptococcus Mucosus Capsulatus.* Two cultures on two persons. (One on a case of pneumonia. One on a case of septicæmia.)

10. *Bacillus Mallei.* Two cultures on two persons.

11. *An Anœrobic Coccus.* Two cultures on two persons. (Each a case of pelvic suppuration.)

12. *Bacillus Fecalis Alkaligenes.* One culture on one person. (On a case running a short duration "Typhoid" course.)

13. *Bacillis Aerogenes Capsulatus.* One culture on one person.

D. Negative Cultures, "Septic Cases."—These are cultures on "so-called" or suspected "septic" cases; they are 606 in number, and include many repeated cultures on the same person as well as the negative cultures on persons whose positive results, if obtained, are recorded elsewhere, except those discussed under negative typhoid and pneumonia cultures.

Thanks are due to Miss Hopkins, who with the assistance of Miss Rosenfeld was of great help in collecting these data.

A PRELIMINARY REPORT ON A SERIES OF CASES OF HODGKIN'S DISEASE

From the Pathological Laboratory of The Roosevelt Hospital

By W. F. CUNNINGHAM, M.D.,
SENIOR INTERNE PATHOLOGIST

In the past five years we have had at the hospital 23 cases of Hodgkin's disease. Six were females and 17 were males; of the latter 1 was a negro. This gives a ratio of 1 female to 2.8 males, but the admission proportion in this hospital is 1 female to 1.7 males. Considering this, from our experience, it is relatively and absolutely more common in men than in women. Reed's series gave 7 males to 1 female; and Bunting, in two series, gives 15 males to 10 females, and, in a second series, 15 to 13. Clark refers to a series of 43, 37 of which were in men; and Zeigler, in a series of 220, mentions 149 of them males and 71 females. Roughly, this shows the disease to be about twice as common in men as in women.

Thirteen of the cases occurred in the third and fourth decades, and 4 each in the first and second. We are unable to make the distinction, referred to by Bunting, of the majority of males being under 34 and that of females over 33. It is generally accepted as a disease of youth and early adult life with occasional cases at both extremes. Zeigler gives 45 per cent of cases between 21 and 40 years.

The primary foci of the disease have been, as observation permits: cervical, 13 (left, 7; right, 4; 2 undetermined); axillary, 3; retroperitoneal, 3; right femoral, 1; intestinal, 1; and undetermined, 2. Of the latter the first lesion noted was in the skin, but we do not consider this as primary. Practically all writers agree to a primary cervical involvement in the majority of cases and suggest the mouth, gums, tonsils, nose, and accessory sinuses as the portal of entry of the infecting agent. Reed considered all cases of this origin, saying that no case had been described in sufficient detail to permit of a positive statement that the disease started elsewhere. We have had 1 case of primary intestinal origin, and Bunting details a case of inguinal involvement following a cystitis. Three of the cases were diagnosed following operation and removal of retroperitoneal tissue. These cases are in all probability of primary intestinal origin. In only 2 of our cases has the onset been definitely traced to previous infections, and both of these were from the throat—tonsilitis and diphtheria.

The following figures are cited from Zeigler's series of 220 cases: primary cervical involvement, 50 per cent; supraclavicular and submaxillary, 6 per cent; axillary, 10 per cent; mediastinal and inguinal, 3 per cent; spleen, 9 per cent; and retroperitoneal, 12 per cent.

The disease is found more commonly in the lower classes, but that it is quite cosmopolitan in its tendencies is shown by the fact that eight countries are represented in this short series.

The time elapsed between the first sign of disease and consultation has varied from a few weeks to ten years with an average of ten months. The following are

given as the reasons for consultation: tumor alone, 14; pain alone, 4 (epigastric, 1; R. L. Q., 2; right arm, 1); tumor and pain, 2; chills and fever, 2; and general weakness, 1.

Eight of the cases were without symptoms throughout the observed course, but all of these, with one exception, were under six months' duration. Of the remaining 15 cases, 5 complained of pressure pain; 4 of abdominal pain, simulating obstruction, gastric ulcer, and appendicitis; and 2 of general body pain. It is to be regretted that we did not have autopsies in more cases (but particularly in the case with skin involvement who suffered severe pain in back and bones) to determine a possible relation to myeloma or myeloblastic pseudoleukemia of Sternberg.

The other prominent subjective symptoms were general weakness and chills and fever in 6 cases, loss of weight in 8, profuse night sweats in 4, pallor in 2, pruritis in 2, toxic vomiting and jaundice, 1 each. Sternberg refers to prurigo exantheme as a frequent early symptom, in 1 case having been present for three years before the development of glands. In only 2 of our cases did such symptoms appear before the end of the first year; and, in 1 of the cases, chills, fever, and sweats were the first symptoms, and another developed similar signs two months after onset. Both these patients left the hospital at their own request in very poor condition, the former with a temperature of 105° F., the latter with 103° F., and lived only a short time. In the other cases such symptoms developed after one year. We differentiated, from a clinical standpoint, two types, symptomatic and latent.

Symptomatic Type

A. Acute.—Symptomatic Hodgkin's might be classified as acute or chronic. The former gives a distinct picture of acute toxæmia, simulating typhoid, sepsis, or malaria, and runs its course in from a few weeks to six to eight months, with progressive loss of weight, general weakness, chills and fever, night sweats, and sometimes vomiting. Osler believed that such reactions were probably due to an intercurrent infection.

We have had 3 cases of this type. Similar cases are reported by Karsner, Clark, and Hirschfield and Isaac. Among the latter cases a description of one of the glands suggests that the disease was probably of longer than six weeks' duration and of the type described in the next group. The course was so acute that I will detail a brief résumé. Patient was 61 years old, gave a history of four weeks' swelling of back of neck, followed shortly by marked weakness, swelling of feet, and difficulty of breathing. The left cervical, the right supraclavicular, and both axillary gland groups were moderately enlarged. Temperature was 101.4° F. to 103.6° F. The blood findings changed from Hb. 20 per cent, R. B. C. 2,290,000, W. B. C. 24,600, in two weeks to Hb. 15 per cent, R. B. C. 1,190,000, W. B. C. 20,000. In six weeks from onset of swelling, the patient died, running a subnormal temperature for several days before death. Zeigler cites a case of a few weeks' duration, and one very suspicious case, acutely toxic, of but a few days' duration.

B. Chronic.—In speaking of chronic cases, of which we had 18, we refer to those of long course characterized by exacerbations and remissions. The majority of cases,

by far, both in this series and in others, might be grouped under this heading. These cases we find to be of more than one year's duration. Many of them, under better hygienic conditions, excision of active foci, hospital routine, and X-ray, improve remarkably for certain periods, but the time comes when all of these measures fail. The subjects pass into a state which characterizes the acute cases, the picture of toxæmia develops, with a high intermittent fever which becomes subnormal a few days before death.

One of our cases was a good illustration of the effects of energetic X-ray treatment, showing exacerbations and remissions subjectively, but with progressive lymphatic enlargement.

Latent Type—Two Cases

The latent type manifests itself in a prolonged course over a period of years with little if any subjective symptoms, save those referable to the local disturbances, absence of fever, chills, and sweats, but characterized by pathological exacerbations in that the glands alternately increase and decrease in size. As an example *par excellence* of this variety we offer 1 case of a duration of twenty-five years. Nowhere in the literature have I been able to find a case which approaches this in duration, the longest, cited by Zeigler, being a case of seventeen years' duration. Our case, with the exception of the disfigurement, appears in perfect health. A second case, of ten years' duration, stands as another example of these cases among our series.

The latter gives a typical pathological picture of Hodgkin's, but the pathological picture of the former is

masked by fibrosis. This type of case is of rare occurrence, for the large majority of the cases come under the heading "chronic symptomatic," all but 5 of the series being of this variety. That is the type of case which, according to Reed, Bunting, and others, runs its course in from three to five years.

Many writers have attempted to designate varieties of Hodgkin's disease from the tissue or location in which it develops, calling it abdominal, splenic, hepatic, or lymphatic, but this classification should be discouraged, as it is a systemic disorder with marked local manifestations. As Sternberg remarks, "it is a systemic, universal disease like leukemia." This writer advises the term "pseudoleukemia" for the group of lymphosarcoma, lymphogranuloma, and plasmoma—diseases with hyperplasia of lymphoid tissue without leukemic blood findings; and speaks of an analogous disease of myeloid tissue, "myelogenous pseudoleukemia." In contrast to this dogma, however, are the cases of Symmers and Zeigler of solitary splenic involvement. The spleen was involved in 7 of our cases, the liver in 4, and the lungs and kidney in the case autopsied. At the present time 1 of our patients has a marked infiltration of the left breast. The above figures are certainly low, for the majority of our cases were seen in the first year. Could we have seen them at later dates, our figures might nearer approach Clark's. In half of his cases an enlarged spleen was noted and in Zeigler's from 65 to 75 per cent.

The involvement of internal organs is merely a question of time; and, though Hodgkin's is a disease primarily selectively lymphatic, it results in a compensatory lymphogenesis in other organs with subsequent involve-

ment. It is on account of this fact that Hodgkin's disease has been considered in the light of a new growth. But of late years there has been a tendency toward the opinion that it is primarily of an inflammatory nature, occasionally showing malignant transformation.

Tusnoda was of the opinion that it is primarily a malignant tumor of lymphoid elements with the inflammation as a matter of secondary importance.

Dietrich believed it to be not a transformed malignancy but a granulomatous lympho sarcoma.

Symmers, Karsner, Yamasaki, and Hirschfield are of the opinion that it is primarily a distinct pathological entity, and that it may undergo malignant transformation.

The Wassermann reaction was made in 7 cases and was found negative in each instance.

The Present Status

The present status of cases in our series is as follows: 7 have died, 2 of these directly following operation, 1 of them with the picture of acute toxæmia. This case, at operation, presented two large retroperitoneal masses, and a section was removed for diagnosis. Patient returned to ward in good condition, but a few hours later was taken with a shaking chill, temperature 104° F., and frequent, projectile vomiting. The following day temperature rose to 105.6° F., followed by chill, collapse, and death.

It was suggested at the time that operative interference may have liberated an excess of toxin, producing a condition analogous to post-operative thyrotoxicosus. The average duration of life in the other 5 cases was two

and a half years, the longest being two years and eleven months, and the shortest eight months.

Of the remaining 16 cases, 9 have not been heard from, 5 show recurrence or active manifestations, 1 is latent, and 1 is apparently in good health. The average duration to date has been three years (exclusive of the one of twenty-five years' duration), the shortest one, and the longest ten. From present indications many of them will probably live a few years longer, but the probable term of life in Hodgkin's disease is an uncertain factor to determine, even when there is an extensive involvement.

Since making these tabulations the case of twenty-five years' duration shows remarkable change. The neck swelling has increased markedly, causing pressure on the larynx and trachea, and there is pronounced edema of left arm and both legs. Fifteen years ago this patient received an X-ray burn, and on the advice of Doctor Leaming this form of treatment is now contra-indicated.

Conclusions

The following conclusions are drawn from a discussion which will appear in full in another publication:*

1. Dorothy Reed Hodgkin's is not a type, but the classical picture—it stands as a distinct entity.

2. Prognosis is difficult. It is impossible to say that a case is cured.

3. Treatment resolves itself into excision of all foci and application of X-rays.

4. Vaccines are of no value.

5. For diagnosis in lymphatic disturbances more than one gland should be obtained.

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6. The following evidence is given to support the idea that Hodgkin's disease is an infection, bacterial or protozoan in origin:

(*a*) The histology is that of an inflammatory reaction.

(*b*) Injections of gland emulsions have caused temporary lymphatic enlargement in lower animals (literature).

(*c*) The fever resembles closely that of other infections.

(*d*) The leucocytosis.

(*e*) The exudate when serous surfaces are involved.

7. The specific organism has not been isolated. A detailed report will appear later to support this.

In conclusion I wish to thank Doctors Warren and Mann, who have made this work possible by their statistics and co-operation, and Doctor McCreery for his earlier work on the records.

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THE OCCURRENCE OF CALLOUS PENETRATING ULCERS IN THE STOMACH AND DUODENUM

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ATTENDING ROENTGENOLOGIST TO THE ROOSEVELT HOSPITAL

That the value of the Roentgen diagnosis in internal medicine is enhanced by any positive indication, in contrast to that giving indirect or inferential information, does not admit of dispute: in no one of the regions into which this subject can be arbitrarily divided is this more evident than in the abdomen, especially in relation to the gastro-intestinal tract.

Since the advent of the Rieder opaque meal, which enables us to see the silhouette of the stomach and intestines, the increase in number and accuracy of the observations has been rapid and notable. Among many such, that of Martin Haudek, assistant in the laboratory of Holtzknecht at the Allgemeine Krankenhaus, Vienna, in relation to chronic gastric ulcer, is of striking importance; as in that institution more than 2,000 stomach cases are examined per annum, his opportunities were exceptional. He found, to put the matter briefly, that in a few cases (2 described at the Berlin Congress in April, 1910; 17 described at the Koenigsberg Congress in September, 1910; and in an article in *Archives of the Roentgen Ray*, June, 1911, he states that at that time he had observed 38 cases) an opaque spot of bis-

muth could be seen at a little distance from the shadow of the stomach, near the lesser curvature; this spot was frequently cup-shaped and was usually, but not always, surmounted by a small air bubble; in a certain number of cases a narrow line of bismuth connected the spot with the stomach; at times the spot was directly on the line of the lesser curvature of the stomach; also, an hour-glass condition of the stomach might be present. These appearances were found to be due to callous perforating ulcers, the peculiarities of which—their tendency to penetrate into neighboring organs and their differences from the ordinary perforating ulcer—had been demonstrated by Schwarz at Karlsbad.

Following the publication of Haudek's article in June, 1911, the above-mentioned indications were sought for in all stomach cases examined at The Roosevelt Hospital; the first one being seen March 5, 1912, and reported, was operated on the following day, found, and excised (see illustrations, group *A*, (Figs. XXXII, XXXIII, XXXIV, XXXV,) for typical examples of the above-mentioned ulcers). It was also found that these ulcers might be recognized when situated close to or at the cardia: a few cases had been examined which had shown a small pouching of the greater curvature at the line of the "magen-blase," sometimes difficult to detect by reason of the concealing mass of bismuth in the body of the stomach; on the lesser curvature, at the cardia, would sometimes be seen, in addition, a small isolated spot of bismuth; these were suspected to be ulcers, but no such report was made, and they were evidently overlooked at operation on account of their situation; finally, on November 1, 1913, a case (Figs. XXXVIII, XXXIX)

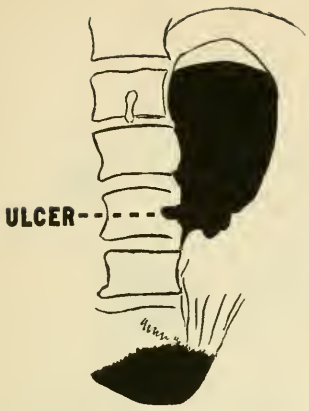

FIG. XXXII. Ulcer at lesser curvature. Hour-glass stomach. At ingestion. Tracing reduced. No. 6405.

FIG. XXXIII. Ulcer at lesser curvature. Hour-glass stomach. Ten minutes p. c. Tracing reduced. No. 6406.

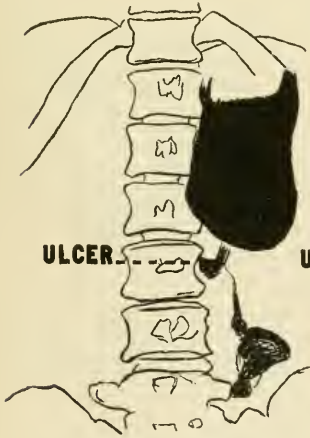

FIG. XXXIV. Ulcer at lesser curvature. Hour-glass stomach. At ingestion. Tracing reduced. No. 5706-B.

FIG. XXXV. Ulcer at lesser curvature. Hour-glass stomach. Ten minutes p. c. Tracing reduced. No. 5706-B.

FIG. XXXVI. Ulcer at cardia. Hour-glass condition. Full stomach. Tracing reduced. No. 6532.

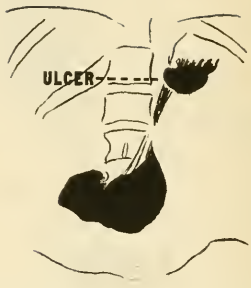

FIG. XXXVII. Ulcer at cardia. Hour-glass condition. Ten minutes p. c. Tracing reduced. No. 6533.

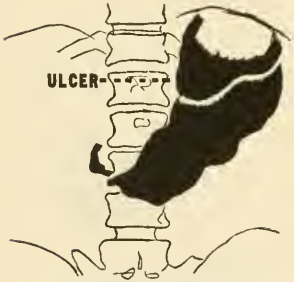

FIG. XXXVIII. Reduced tracing from original negative. Ulcer at cardia. Hour-glass stomach. The full stomach. No. 4545-B.

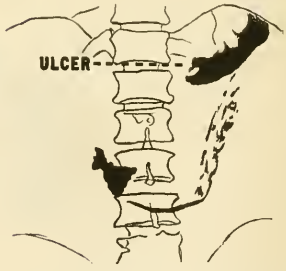

FIG. XXXIX. Reduced tracing from original negative. Ulcer at cardia. Hour-glass stomach. Six hours p. c. No. 4545-B.

GROUP B.

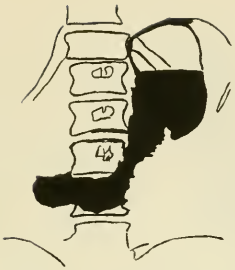

FIG. XL. Carcinoma of the greater curvature. For comparison and contrast with cases Nos. 4545-B, 6532, 6533. Reduced tracing from original negative. No. 6245.

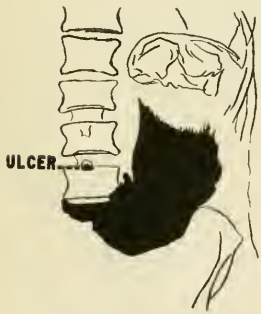

FIG. XLI. Ulcer of bulbus duodeni penetrating head of pancreas. The full stomach. Tracing from original negative, reduced. No. 3163-B.

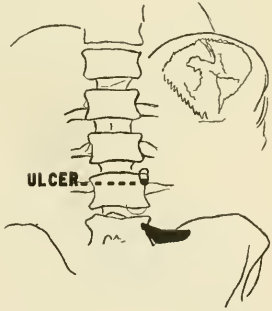

FIG. XLII. Ulcer of bulbus duodeni penetrating head of pancreas. Six hours p. c. Tracing from original negative, reduced. No. 3163-B.

FIG. XLIII. Ulcer of bulbus duodeni. The full stomach. Tracing reduced. No. 5047-B.

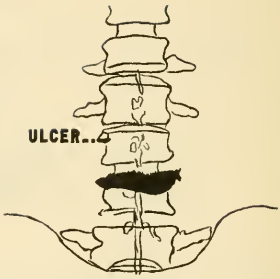

FIG. XLIV. Ulcer of bulbus duodeni. Six hours p. c. Tracing reduced. No. 5047-B.

FIG. XLV. Ulcer of duodenum, falciform ligament adherent to ulcerated area. The full stomach. No. 4891-B.

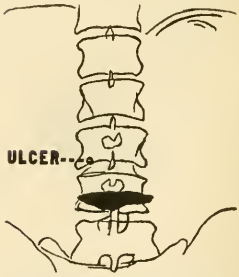

FIG. XLVI. Ulcer of duodenum, falciform ligament adherent to ulcerated area. Six hours p. c. No. 4891-B.

was received from an outside clinic on which a diagnosis of duodenal ulcer had been made; no abnormality of the duodenum could be found at the X-ray examination, but, the above-mentioned appearances at the cardia being noticed, the surgeon made a special search of that region and made the following report: "Median incision above umbilicus. Exploration of stomach showed an indurated ulcer the size of a silver quarter (U. S. currency) on the lesser curvature just below the cardia. End of the induration impinged almost on the cardia itself. Through the stomach wall a distinct crater could be felt in the centre of the ulcer. It was not adherent posteriorly. Pyloric portion of stomach and duodenum seemed normal. Gall-bladder palpated normal. No exploration of appendix." The surgeon also remarked that it was quite possible to have overlooked the ulcer in this case had his attention not been specially directed to an examination of the cardia, as even then it was hard to find. See groups *B* (Figs. XXXVI, XXXVII, XXXVIII, XXXIX) for typical examples of ulcers near cardia, and compare them with hour-glass stomach caused by carcinoma of greater curvature (Fig. XL).

The early recognition of these callous penetrating ulcers, as shown by Haudek, is in reality (on account of their well-known tendency to degenerate into, or have form upon them, carcinoma) an early diagnosis of cancer. Payr says 43 per cent, Küttner 26 per cent, of ulcers of the corpus ventriculi become cancerous. Payr calls the resection of chronic gastric ulcer the early operation for carcinoma. As an illustration of this, follow the particulars of a case that was examined March 26, 1914. The patient, female over 40 years, gave a typical ulcer

history extending back for a number of years; two years ago her appendix had been removed; her symptoms had continued, but a change had been noticed within the last year and a half; her periods of well-being had practically disappeared, her appetite was no longer good, and she had lost weight, although she was still a stout woman; all signs, as will be observed, pointing toward a malignant change in her condition. She looked chronically ill. The stomach was large with an ill-defined lesser curvature. Position and shape normal. Moderate retention in six hours. A patch of bismuth above the pyloric region remained constant throughout the examination. Diagnosis, callous penetrating ulcer. The report of the subsequent operative findings are as follows: "Median incision above umbilicus. A very large, indurated, saddle ulcer of lesser curvature was demonstrated. Induration practically extending from pylorus to cardiac orifice, occupying the entire lesser curvature. Stomach wall much thickened, felt as though the crater of the ulcer was very long, occupying the whole (nearly) of the lesser curvature. Adjacent glands not enlarged. No evidence of surrounding growth or secondary deposits. Impossible to tell whether the process was benign or malignant. As excision would have meant nearly a total gastrectomy, and been accompanied by great risk, gastro-enterostomy was decided upon after consultation with the patient's physician, who was present. Posterior gastro-enterostomy performed. Usual two tiers of linen sutures. Opening about 1½ in. in the clear. Palpation of gall-bladder showed no evidence of disease. Appendix had been removed at former operation. Omentum very heavy and fatty. Stomach considerably bound down by contraction around

the ulcer, making the operative procedure rather difficult. Opening in the transverse mesocolon anchored to the suture line in the usual way."

Several months later this patient returned, the mass of the callous ulcer in the stomach had grown rapidly larger, and was very evidently then carcinomatous. If we study the above case, it is evident that at the time she had her appendix removed the callous ulcer of the stomach must have been there, and an X-ray examination would have in all probability shown its existence and character, it would have been much smaller, would not then have been malignant, and an operation promising not only relief but cure could have been undertaken.

On October 22, 1912, a case (Figs. XLI, XLII) was sent to the X-ray Department for confirmatory examination, with a history and clinical diagnosis of duodenal ulcer. Besides the usual evidence of duodenal ulcer, there was seen in the region of the bulbus duodeni a small cup-shaped mass of bismuth surmounted by an air bubble, which persisted throughout the examination. In fact, the bismuth was found at operation the following day. The signs were so typical of the condition that the diagnosis was made, before the patient left the X-ray room, of callous penetrating ulcer of the duodenum; also, on account of the patient's history of long-continued, acute, boring pain in the back, it was stated that the ulcer had probably penetrated the head of the pancreas. Follow the operative findings. "Exploratory celiotomy. Posterior gastroenterostomy. Suture. Incision just to the left of the median line. Stomach exposed and drawn into wound. Pyloric region delivered easily. Scar of ulcer just distal to pylorus. On under and upper surface of the

duodenum, behind the head of the pancreas, was a densely indurated mass larger than a hen's egg. No evidence of growth in stomach wall at any point. Gall-bladder normal. An opening was made through lesser omentum exposing posterior border of duodenum and head of pancreas, and there a small cavity was found lying between the duodenal wall and the head of the pancreas, evidently a small abscess cavity from a perforation of the posterior surface of the duodenum against the head of the pancreas. It was around this cavity, the size of the terminal phalanx of the little finger, that the induration lay within the head of the pancreas, evidently the inflammatory reaction around the abscess cavity. A small wedge of tissue was taken from the pancreas, at the edge of the abscess, for section." Follows the pathologist's report: "Nothing to identify tissue as coming from pancreas. Consists of granulation tissue, at one margin of which fibrous tissue is condensed, bounding an area infiltrated with round cells and polynuclears, forming an abscess. Pathological diagnosis, inflammatory tissue, abscess formation." (See Figs. XLI, XLII, XLIII, XLIV, XLV, XLVI.) Alfred E. Barclay, of Manchester, England (*Arch. of the Roent. Ray*, 1910, 123), points out that such radiological appearances as those in the above case are frequently due to pouching in the duodenal wall, the result of scar contraction of a healed ulcer.

Kreuzfuchs (*Berl. Klin. Woch.*, 1912, No. 33), in addition to the usual roentgenological evidence of duodenal ulcer, finds as evidence of that condition a persistent deposit of bismuth in the first portion of the duodenum, several hours after meal-time. Pfahler (*Am. Quart. of*

Roent., February, 1913): "A remnant of bismuth outside of the duodenal outline, associated with resistance, and not easily movable, points toward a penetrating duodenal ulcer." Case (*Jour. Mich. State Med. Soc.*, November, 1912): "In rare cases a fleck persists in the duodeum in the crater of an old ulcer." Moynihan (*Duodenal Ulcer*, 2d edit., 1912, pp. 270 *et seq.*) says: "The puckering which occurs when a mass of tissue contracts almost always seems to radiate toward the centre of the ulcer, which is depressed to a greater or less degree. The ulcer may then appear to be star-shaped, the centre being drawn in and dimpled. The appearances produced by this process of puckering and contraction vary greatly; in some cases a peculiar condition of 'pouching' of the gut is produced. A piece of the duodenal wall seems almost separated from the rest, being nipped away from it, as is the bowel in a Richter's hernia. Of this I have seen at least a dozen good examples; the pouch so formed lies always along the lower border of the gut. In some cases the pouching may be very considerable, so that a 'diverticulum' is formed." Perry and Shaw give details of several "pouched ulcers" (pp. 277, 278, 279), the sacculus being, in one, large enough to contain a walnut. An excellent example is seen in specimen 1152 in the London Hospital Museum. An interesting paper on "Duodenal Diverticula" was published many years ago by Roth (*Virch. Archiv.*, 1872, LVI, 197). He describes 5 cases illustrating two forms of pouch, the one lying in the superior transverse portion of the duodenum, the other and more common in the descending portion, on its posterior and inner wall, adjoining the pancreas. The latter forms are now recognized to be

congenital in origin; the former are acquired and are due to the yielding of the duodenal wall at or near the site of a chronic ulcer, or to the complete destruction of the wall in the base of an ulcer and the subsequent deep erosion of the pancreas.

L. S. Pilcher (*Annals of Surgery*, 1894, II, 62), in recording a case of "large pseudo-diverticulum of the duodenum," states that Morgagni, in 1761, noted in the body of a man, 54 years of age, the existence of a kind of diverticulum of the duodenum, situated at a spot distant two digits below the pylorus, where a loss of substance of the mucosa was evident, forming an orifice capable of admitting a finger leading into a cavity enclosed within the dilated outer coat.

It is quite evident that, excepting the congenital pouching of the descending portion of the duodenum described by Roth, these descriptions can refer to no other than the callous penetrating ulcer that we have been describing, and shows that the surgical recognition of such conditions in the duodenum is of some antiquity; it also goes far to confirm a belief that has been gradually growing, as the result of my observations in the X-ray Department, that the callous penetrating ulcer of the duodenum is more frequent in occurrence than the callous penetrating ulcer of the stomach, just as it is known that duodenal ulcers in general are more frequent than those of gastric origin.

It is well known that carcinoma forming on callous duodenal ulcer is of rare occurrence, Moynihan says "excessively rare"; but W. J. Mayo has shown that, when the lesion in the duodenum extends up to or invades the pylorus, the gastric margin of this ulcer may be

the starting-point of a carcinomatous growth. I should be inclined, then, to claim that their recognition might, as in the case of the callous penetrating ulcer of the stomach, be an early diagnosis of carcinoma. The majority of these ulcers, both gastric and duodenal, that I have had the opportunity of observing, have not penetrated into a neighboring organ; they have, however, shown that tendency; the wall of the stomach or duodenum has invariably been found to be much thickened, the serous coat smooth or puckered, with a cavity extending from the mucous coat toward the surface, evidently an abscess formation that slowly bores its way outward, nature, in the meantime, protecting the patient from perforation by adhesions of the outer coat to some neighboring structure or by the protecting covering of the products of inflammation. As in 2 cases of duodenal ulcer (see Figs. XLV, XLVI) in which the history indicated that a perforation had occurred some time previously, the operation disclosed a callous ulcer of the duodenum that had penetrated the wall of the gut, had become adherent to the falciform ligament of the liver, and was surrounded at that point by dense inflammatory adhesions.

It will inevitably occur that in some cases the diagnosis of these ulcers in the duodenum will not be sustained by the operative findings and the case will be reported as appendicitis; but it is to be remembered that the duodenal ulcer may still be there. A large number of duodenal ulcers are found by the surgeons to be accompanied by a pathological appendix; many think that they are secondary lesions to some pathological condition elsewhere. Moynihan says (p. 154, *loc. cit.*): "There

can, I think, no longer be any question that both gastric and duodenal ulcers are secondary to some toxic or infective process, the various stages of the disorder being infection, congestion of gastric mucosa, with erosion (possibly the result in many cases of retrograde venous embolism, as shown by Wilkie in *Edin. Med. Jour.*, 1911, I), superficial ulceration (the "medical ulcer" of American authors), and finally chronic ulcer. In many of my cases the primary septic focus would certainly appear to have been in the appendix. It is therefore probable that, in some instances in which symptoms suggestive of duodenal ulceration have been present and only a diseased appendix discovered, some superficial and inconspicuous lesion of the duodenal mucosa was already established." He cites a case in his own series of this nature, and one reported by Paterson (*Lancet*, 1911, I, 97). There have been cases here where, after removal of the appendix, a subsequent operation was performed for the duodenal ulcer that was not found at the first operation.

The greatest safeguard against errors in these cases is to bring to our aid all the clinical information we can obtain, together with a thorough X-ray examination, and also a carefully taken anamnesis, which, after all, is still the most important of all our diagnostic aids.